Founded in 1832

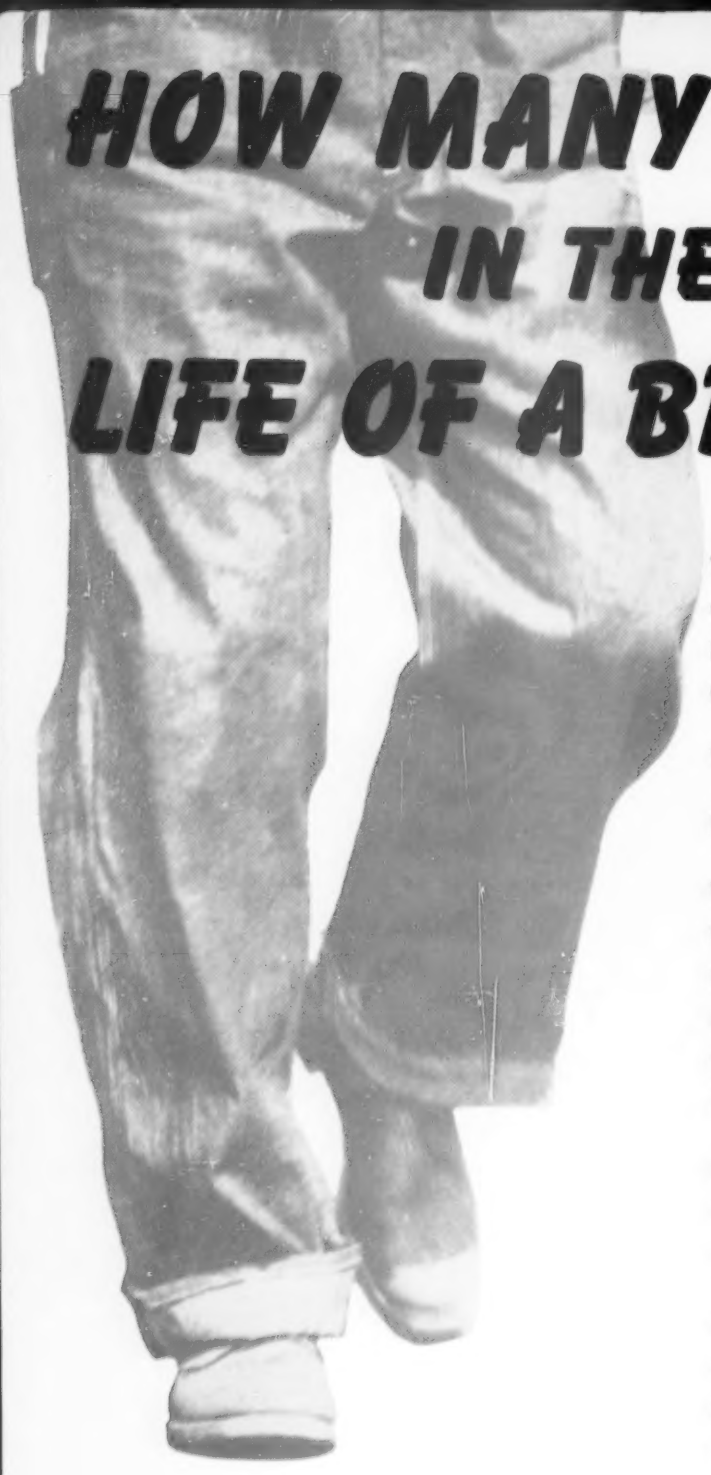
RAILWAY LOCOMOTIVES AND CARS

JANUARY 1956

One of Five Specialized Railway Age Publications

1894
62
QUALITY AND SERVICE FOR 62 YEARS
Your constant interest has always been our inspiration
to produce railway appliances of outstanding and lasting performance
W. H. MINER, INC. · CHICAGO

HOW MANY STEPS IN THE LIFE OF A BRAKE BEAM?



The railroads use millions of time-consuming, money-wasting steps each year carrying freight car brake beams into reclamation plants for dismantling and reassembling—then back again to the stores department.

Truslock cuts the number of those steps right in half!

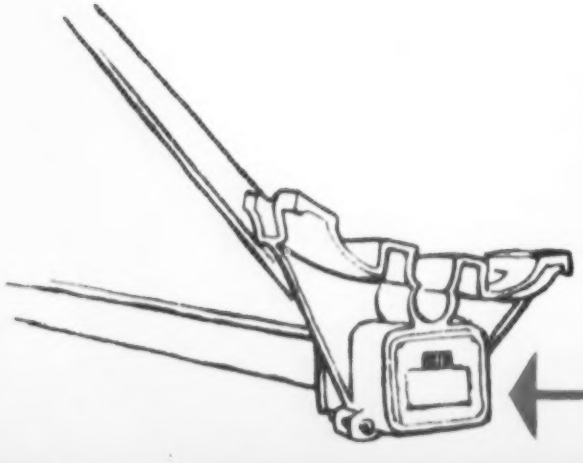
Here's why—

Worn or damaged brake heads account for at least half of the brake beams coming into reclamation plants. It stands to reason that a brake beam equipped with a quick-change brake head—replaceable in a jiffy without special tools or the need to disassemble the brake beam—will cut your reclamation costs by fifty percent.

Economical maintenance is only one of the many TRUSLOCK features that have sold this premium brake beam to 72 railroads and private car lines.

YOUR FIRST BRAKE HEAD CHANGE ON A TRUSLOCK WILL SAVE YOU MORE THAN THE SMALL PREMIUM YOU PAY FOR THIS TOP-PERFORMANCE BRAKE BEAM . . . MAKES TRUSLOCK THE LOWEST COST NO. 18 BRAKE BEAM YOU CAN BUY.

BUFFALO BRAKE BEAM COMPANY
NEW YORK • BUFFALO

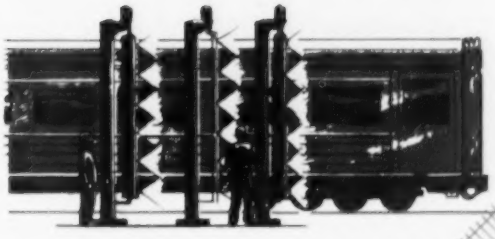


TRUSLOCK

The Buffalo Brake Beam with the Quick-Change Brake Head

Oakite gives you the IMPORTANT advantage . . .

LOW-COST END RESULTS



FOR EXAMPLE: *one railroad saves $2625 a month on car washing . . .*

With cleaning materials, cost per pound can deceive you. Compare costs at the *end* of a job to find your best buy.

It's with just such a comparison that one smart operating official is saving his road thousands of dollars. Here's what the records show when Oakite Compound No. 88 is used in a single end automatic car washer.

	Initial Cost per lb.	Solution used	No. of lbs. required to clean 7500 cars	Cost of material per car cleaned	Total material cost per month
Cheaper Cleaner	.16	3 oz./gal.	21,093¾	.45	$3,375.00
Oakite Cleaner	.18	1½ oz./gal.	4,166⅔	.10	750.00

Monthly savings to Railroad are: $2,625.00

Oakite Compound No. 88 successfully does what the material it replaced could not do. It loosens all grease, grime and Crater's Compound from car sides for easy rinsing *without leaving any streaks on sides and windows.* And, as the figures show, it does this with a more *economical* solution.

Here, then, is actual case-history proof that in railroad cleaning, Oakite gives you the IMPORTANT advantage . . . LOW-COST *END RESULTS.*

To find out how specialized Oakite Cleaning materials and streamlined Oakite methods can save money for your railroad contact your local Oakite man or send for 56-page booklet "How to make sure of the best in railroad cleaning." No obligation. Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

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SCIENCE

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RAILROAD DIVISION

"Boy! He handles that thing just like a taxi!"

The Westinghouse Air Brake 6-SL Brake Equipment

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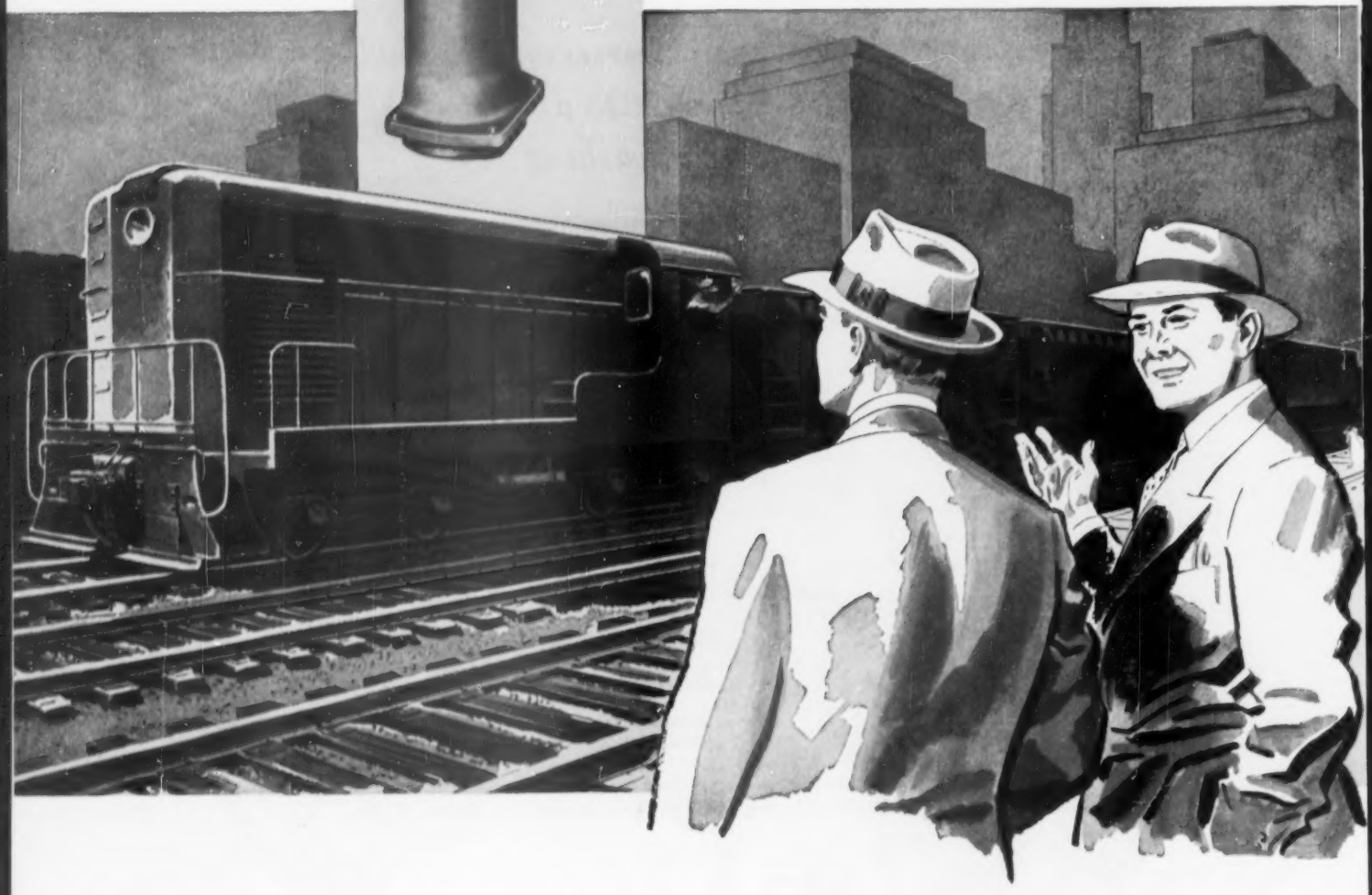
The 6-SL Brake Equipment is built specifically for yard switchers. It provides a high degree of flexibility —matching that of the Diesel switcher itself. It performs along with the Diesel, 'round the clock, and thereby contributes to the high working availability of yard switchers.

The 6-SL Brake provides all the basic functions that enable a modern yard switcher to perform most productively and economically.



Westinghouse Air Brake Company

AIR BRAKE DIVISION

WILMERDING, PA.

PUBLISHED MONTHLY BY THE

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Founded in 1832 as the American Rail-Road Journal

JANUARY, 1956 VOLUME 126, NO. 1

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PLYPAK *REDUCES* HOT BOXES by more than 80%

Sept. 12th 1955 Railway Age in "Pensy proves its Plypacks" reports 1/5 the percentage of hot boxes for Plypak equipped cars.

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due to lubrication failure
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WASTE CONTAINER AND RETAINER

More than 200,000 PLYPAKS in service on 32 railroads tell the story. PLYPAK is the answer to the hot box problem.

Under all operating conditions, PLYPAK holds waste in place ... even at sub-zero temperatures.

To eliminate the hot box caused by lubrication failure, equip today with PLYPAK!

EQUIPMENT COMPANY,

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EQUIPMENT... *New Ideas—New Uses*

Steam Cleaning Gun

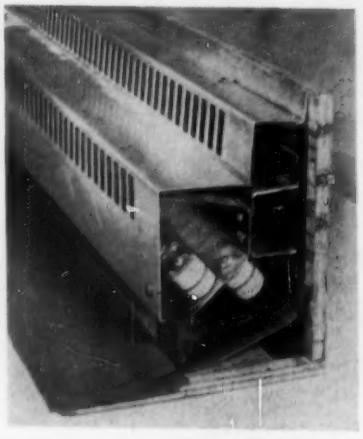
This solution-lifting steam gun uses the cleaning solution to protect the operator from the heat of the steam. The Hurriclean, as it is called, uses a tube within a tube—steam passing through the insulated interior tube and solution through the exterior. Vacuum formed by steam emerging from the center tube draws solution into the nozzle for mixing. The gun has a sealed rotary joint making it possible to rotate the nozzle without twisting or wrestling heavy solution or steam hoses. While the front of the gun revolves to clean at any desired angle, the handle and hose connections remain stationary. The gun was designed so that thrust from the steam is taken up between the two grips.

The gun has a cast aluminum spade-type rear handle, cast brass valves, stainless outer and inner tubes and nozzle, and an oil resistant forward grip. Only moving parts are the valves and the rotary joint. A stainless tip protects the nozzle. Steam at 30 psi and connections to a container of cleaning solution are all that are required to use the gun. Steam and solution valves can be adjusted to produce best cleaning. To rinse, the solution valve is shut off and only steam is used. The gun weighs 6¾ lb in the 3½-ft length. The 5-ft model weighs a little more. *Oakite Products, Inc., 146 Rector street, New York 6.*

Air Rewind Hose Reel

This hose reel rewinder which is operated by compressed air, has been designed for fuel delivery and industrial use. To rewind payed-out hose, the operator presses the one-finger control lever which sends air through the control to the motor which drives the revolving drum. To stop the reel at any time, the operator removes the finger from the lever.

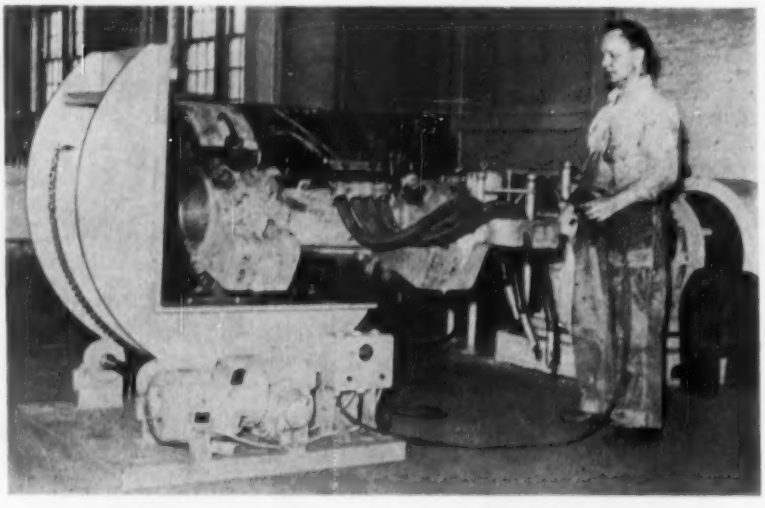
These explosion-proof rewind reels are said to be easier to install and maintain. The motor and valve control system simplifies the compressed air piping system arrangement. For installation in compartments on trucks or in hard to reach areas, the control can be supplied off the reel for placement within reach of the operator. The system can be ordered with the manufacturers hose reels for hose up to 3 in. inside diameter. Explosion proof electric, hydraulic and hand crank operated rewinds are also available. *Clifford B. Hannay & Son, Inc., 976 Main street, Westerlo, N.Y.*



Convection Heater

The Convectair is an arrangement of electric strip heaters and reflectors that mount inside a heater guard. A strip heater is supported on each side of the reflector so that the higher wattage heater has a greater stack height and the lower wattage heater has the lesser stack height.

Reflector arrangement insures that the air passing over one heater does not pass over the other heater. Most of the heat is delivered to the car body by convection, resulting in a safe temperature of the heater guard which does not exceed 150 deg F. Its design fits into the space usually alloted for a floor heater guard and can be applied to existing cars. *Ogontz Controls Company, 8029 York road, Elkins Park, Philadelphia 17.*



Traction Motor Up-Ender

The Peerless type HW traction motor up-ender facilitates the removal and insertion of traction motor armatures. Armature handling is done with the motor frame in a vertical position. The bearing caps and other components can be worked with the motor horizontal. The complete unit is mounted on a welded steel base which does not need to be fastened to the shop floor.

The steel rocker assembly weldment is mounted on four flanged wheels which operate in roller-bearing pillow blocks. Positioning is done by a 1-hp, 3 phase, 60 cycle, 220/440-volt motor driving through a worm-gear speed reducer. The output shaft of the speed reducer is connected to the rocker assembly drive shaft with a flexible coupling. This roller-bearing mounted drive shaft has a sprocket which drives a roller chain fastened to the rocker assembly. Electrical controls include forward and reversing push buttons in a portable station. There are interlocking limits control stops for the horizontal and vertical positions. *Electric Service Manufacturing Company, 17th and Cambria streets, Philadelphia 32.*

(New Devices continued on page 84)

When the going is tough..... snow and ice can't stop the Spicer Railway Generator Drive!

Look at the record of more than 11,000 Spicer Railway Generator Drives operating all over the world . . . under the world's most extreme weather conditions

. . . ***and you'll find a remarkable record of constant service!***

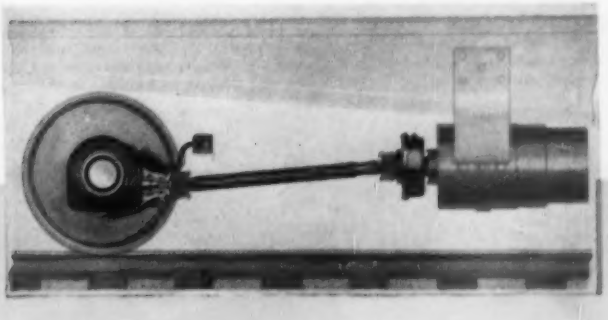
The Spicer Drive, being of the positive type and ***fully*** protected, is not affected by ballast, dirt, snow, rain, ice, sleet, or hot or cold weather .

The Spicer Drive assures a high degree of efficiency at all times, and keeps batteries fully charged under the most adverse operating conditions.

The Spicer Drive has no belts or chains to slip or come off. No fuel mixture to be affected by changing altitude or atmospheric conditions. Nothing to jerk, jar, jam or get jimmied up.

Spicer case-hardened alloy steel gears and anti-friction bearings operate in a light oil, reducing friction and heat losses to a minimum. Power transmission losses are remarkably low.

Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs. Write for further details.



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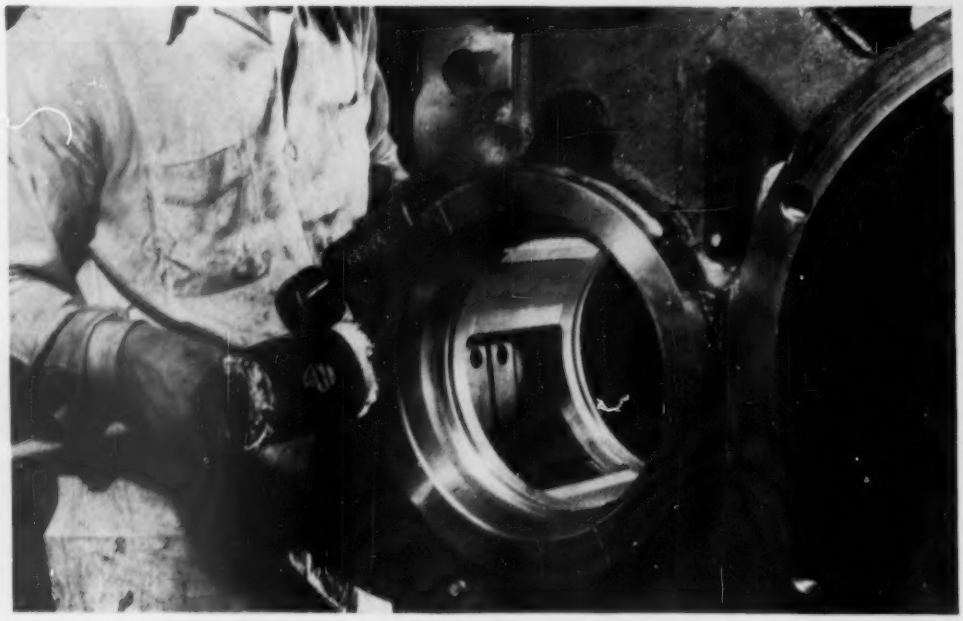
DANA CORPORATION

Toledo 1, Ohio

7 G-E replacement parts for better locomotive operation



1. G-E MOTOR SUSPENSION BEARINGS with *oil-return* grooves can save you up to $85.00 for each locomotive unit annually.

How G-E Motor Suspension Bearings Give Long Life, Low Maintenance Costs

With General Electric's ***oil-return*** traction-motor suspension bearings, a passenger unit, averaging 20,000 miles per month, is capable of reducing oil consumption approximately 220 gallons per year. It's accomplished by ***oil-return*** grooves cut into the bore at each end of the bearing. Through these grooves excess lubricating oil is ***returned*** to the axle-cap—not onto the roadbed.

In addition, G-E suspension bearings are ideal for high-speed railroad service. Their special alloy composition resists breakage and wear under today's tough operating conditions. Their rigid construction, which helps keep them tight in the axle-caps, means still less wear on bearings and traction-motor gearing.

To get the performance you originally bought, always specify genuine General Electric traction-motor suspension bearings—the bearings that are designed as an integral part of your G-E traction motor. General Electric Co., Locomotive & Car Equipment Dept., Erie, Pa. 128-21

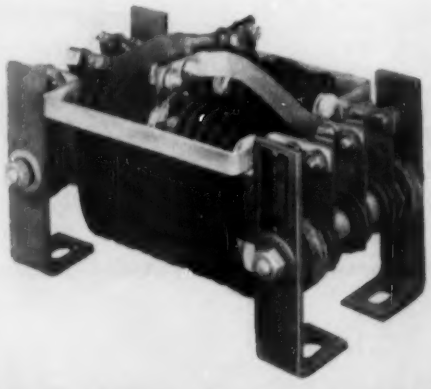
Progress Is Our Most Important Product

GENERAL ELECTRIC

2. G-E RECOMMENDED CARBON BRUSHES are selected for the proper degree of hardness and grain structure to minimize wear and tear on commutator surfaces of your unit.

3. G-E GEARING is designed and quality-control manufactured to carry the heavy starting loads and take the running shock loads encountered in today's heavy railroad service.

4. G-E RESISTORS have floating steel backbones that expand and contract freely with high temperature changes and therefore are not subject to harmful buckling forces.

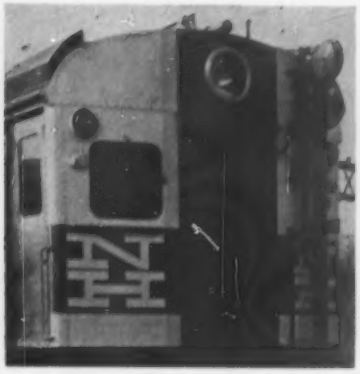


5. G-E COMMUTATORS retain smoothness in rigorous service because high-speed, high-temperature seasoning process sets segments firmly in place, cuts down friction wear and tear.

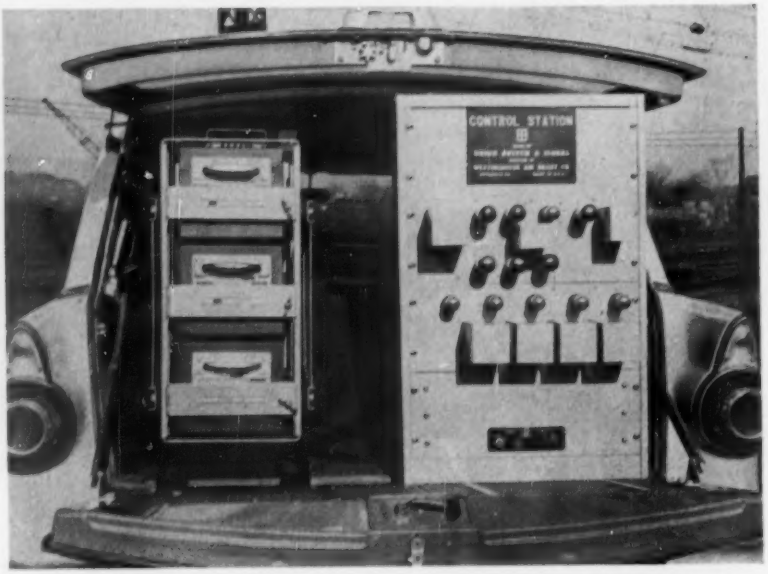
6. G-E ARMATURE COILS are available as part of complete rewind kits for your convenience. Every coil is dimensionally accurate and quality insulated for longer life.

7. G-E CONTACT PARTS break circuits quickly with a minimum metal transfer. This assures you of long service life from these parts.

NEWS . . . . . .



Mounted on the outside and head end of the car equipped for remote control operation are two receiving coils. They pick up the inductive carrier signal, one receiving the signal from the trackside telephone and the other the signal for control of the car from the equipment mounted in the station wagon.



Equipment which performs at the dictation of the control panel on the station platform for operating the train by remote control is mounted in rear of a station wagon. Panel at right governs stopping, starting, forward and reverse motions of train. Panel at left contains transmitter, receiver and power unit.

New Haven Operates Train by Remote Control

Remote control of a train from a wayside station was demonstrated on the New Haven on December 1, 1955. The train consisted of a single rectifier type m-u car which was operated between New Rochelle, N.Y., and Rye, N.Y., a distance of 7.5 miles. For the purpose of the demonstration this section of line and the car were equipped with an inductive type contact system for operating the car, with automatic train control including train stop and in inductive type telephone communication system between the wayside control point and the car. The car was started and stopped and run in both directions from the wayside control and allowed to be stopped automatically by the train stop with no one in the operator's cab. Control equipment on the car, which would normally be mounted underneath, was placed inside the car for demonstration purposes.

The equipment for remotely controlling the operation of the locomotive is a recent development of Union Switch & Signal—Division of Westinghouse Air Brake Company, and used first in classification yard service. A visual indicator on the train displays the control commands transmitted from the wayside station and can display brakes off, power on—east, or power on—west.

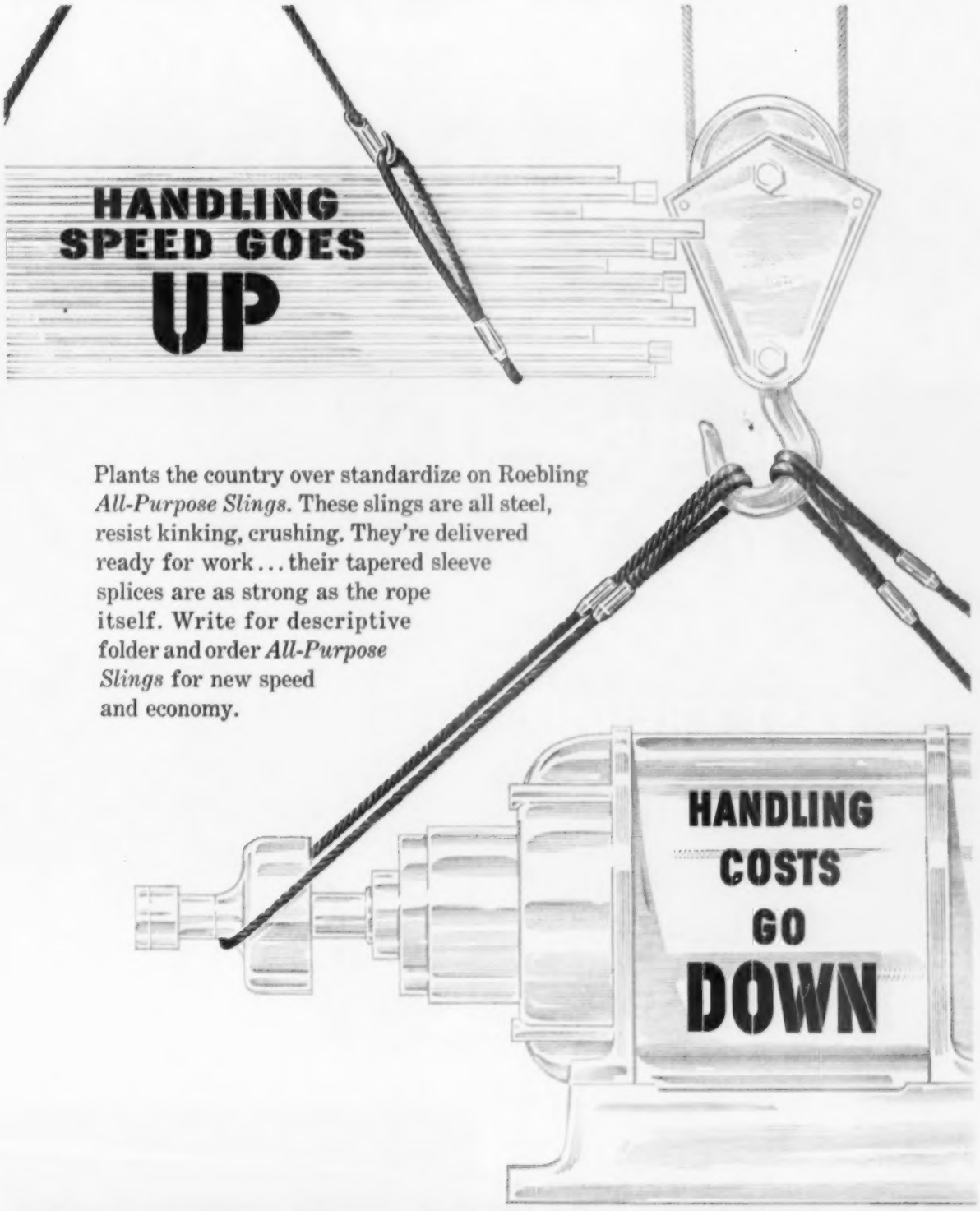
The wayside equipment has a locomotive control panel with two miniature-type control levers. One lever selects either eastward or westward running and the other selects between neutral, run, and stop. When the lever is on neutral, the train brakes are released and power is cut off. When the lever is turned to the run position, power is applied and the locomotive runs in the direction selected by the other lever. When the lever is placed in the stop position a service application of the train brakes follows, bringing the train to a stop.

P. B. McGinnis, President, New Haven, expresses his wishes on the movement of the train and George Baughman, vice-president, Westinghouse Air Brake Company, translates them into car movements by means of the control panel on the platform of the Larchmont, N. Y., station. The little black box at the right controls the train. The telephone permits two-way conversation between the train and the control point.

A representative of the Union Switch & Signal Co. explains operation of the equipment installed in the car during the test run. The large metal case in foreground contains cab signal receiving equipment which picks up coded signals by the rail from the signal system already in service on the railroad. Mounted on it at top left is a four-acceptance indicator light panel. As the receiver picks up the coded signal, visual lights come on the panel. Top is green for clear board ahead, next shows yellow over green for the signal just past, next a yellow indicator for the approach signal ahead, and bottom, red indicator which indicates restrictive block and will stop the train. The second metal case at left which also has a light indicator panel mounted on top, receives and interprets the controls given from the wayside station for remote control of the car. Telephone handset in center receives from the wayside telephone.

The electronic portion of the wayside equipment consists of a power supply, an audio oscillator and a carrier modulator. The equipment creates a carrier frequency by means of an oscillator, modulates this carrier with certain audio frequencies and amplifies this modulated carrier to the desired level of signal current. The output of the carrier modulator is connected to the existing line wires which parallel the track. The position of the two miniature type levers on the locomotive control panel determines which audio frequencies are to be introduced into the carrier modulator. When the lever is in the run position, a

(*Continued on page 14*)



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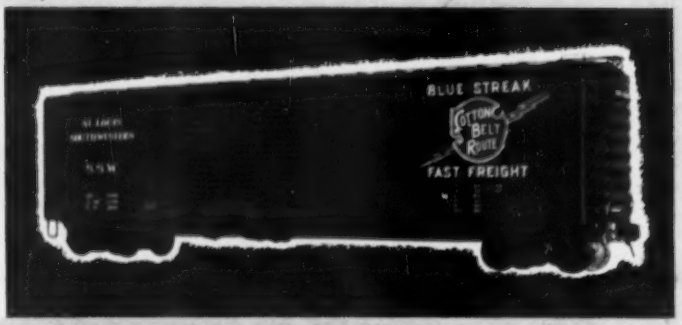
WACO
TEXAS

* This contribution to the nation's freight car supply follows recent Southern Pacific announcements that it plans to add another 10,000 cars costing $90,000,000 to its freight car fleet. Thus, its total number of cars acquired or on order since World War II will be brought to more than 57,000.



PS-1 BOX CAR

The Cotton Belt, ordering the 75,000th PS-1 Box Car, signals 1956 as the Tenth Anniversary of Freight Car Standardization

The progressive and service-minded St. Louis & Southwestern Railway Co., the famed Cotton Belt, has ordered the 75,000th PS-1 Standardized Box Car to be built by Pullman-Standard Car Manufacturing Company.

This means that since Pullman-Standard made standardized freight cars available in 1946, over 75,000 PS-1 Box Cars have been put into service or ordered by the railroad industry. The Cotton Belt's purchase, therefore, has both numerical and chronological significance: it heralds 1956 as the Tenth Anniversary of Freight Car Standardization.

With the introduction of the PS-1 in 1946, an important railroad need was filled; the need for a low-cost, minimum maintenance, high performance, precision built, mass produced box car that was designed and tested to serve equally well on all parts of the Great American Railway System. The acceptance earned by the theory of standardization in the form of the PS-1 fulfilled Pullman-Standard expectations. In only ten years, one out of every twelve of all U. S. box cars is a PS-1. And at the present rate of purchase, more than one out of every two box cars ordered from all builders, including commercial carbuilders and the railroads' own shops, is a PS-1 Pullman-Standard Standardized Box Car.

Pullman-Standard plans to make special note of 1956 as the Tenth Anniversary of Freight Car Standardization.

And the purchase of the 75,000th PS-1 has earned the Cotton Belt, an affiliate of the Southern Pacific Company*, the first Tenth Anniversary salute. This important railroad is a quantity user of Pullman-Standard Standardized Freight Cars—both PS-1 Box Cars and PS-2 Covered Hopper Cars. The addition of the 75,000th PS-1 to the Cotton Belt's fleet is another indication of the up-to-date, modern equipment these forward thinking railroads are using to provide pace-setting service for their many important shippers and consignees.

WORLD'S LARGEST MANUFACTURER OF PASSENGER AND FREIGHT CARS

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

79 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

NEWS

(Continued from page 10)

pair of audio frequencies is introduced into the modulator—when the lever is in the neutral position only one audio frequency is used—and when the lever is in the stop position no audio frequencies are present.

The control commands from the wayside station are transmitted to the locomotive through inductive coupling between the modulated carrier current flowing in the line wires and a receiving coil mounted on the locomotive. The locomotive equipment is tuned to accept and act on the received signal indications from the wayside locomotive control panel.

To run the train east a carrier frequency of 94 kc is modulated by a 225-cycle current. To apply power a modulating current of 535 cycles is added to the 225. To stop, modulation is removed. To run west modulations of 1,125 and 535 cycles are used. A carrier frequency of 144 kc is used for telephone communication.

Automatic Train Control and Cab Signal Equipment

In order that this demonstration be conducted with complete safety, the locomotive was equipped with a standard Union cab signal equipment. Commonly referred to as automatic train control, this train-carried equipment is continuously responsive to rail-carried currents which reflect track conditions in advance of a train and the cab signal continuously indicates track and traffic conditions ahead. If the train should be moving and traffic conditions in advance are such that it is not safe for the train to continue, the brakes will be automatically applied and the train will be brought to a stop regardless of the controls being issued from the wayside station. The cab signal equipment in this demonstration for the first time uses junction-type silicon transistors in place of vacuum tubes.

Inductive Train Communication

To establish two-way voice communication between the train and the wayside station a standard type of Union inductive train communication equipment was installed on the train and at the wayside station. This equipment, like the remote control equipment, operates on the inductive principle. This equipment permitted the person exercising the control from the wayside station to announce to the passengers on the train any change in the control function so that the change could be anticipated by those on the train.

W. J. Patterson Dies; Was Member of ICC

William J. Patterson, former member of the Interstate Commerce Commission, died in Washington, D. C., November 24. He was 75 years old.

Mr. Patterson retired as commissioner July 10, 1953, rounding out a career with the commission which began in 1914. Until his appointment to the commission in 1939, that career was with the commission's former Bureau of Safety, of which he was assistant director for 16 years and director for five years.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horsepower	Service	Builder
Canadian National	29[1]	1,200	.....	Gen. Motors Diesel, Ltd.
	6[1]	.....	.....	Gen. Motors Diesel, Ltd.
Pennsylvania-Reading Seashore Lines	6	1,600	Road	Baldwin-Lima-Hamilton
	6	1,200	Switching	Baldwin-Lima-Hamilton

GAS-TURBINE-ELECTRIC LOCOMOTIVES

Road	No. of locos.	Horsepower	Service	Builder
Union Pacific	15[2]	8,500	Freight	General Electric

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Atlantic Coast Line	500[3]	50-ton box	ACF Industries
	275[3]	50-ton box	Company shops
	100[3]	50-ton pulpwood flat	Company shops
	720[3]	Hopper	Company shops
Canadian National	25[4]	Double-deck auto	Canadian Car & Fdry.
Chesapeake & Ohio	1,000[5]	70-ton gondola	ACF Industries
	4,500[5]	Hopper	Company shops
	1,000[5]	Box	ACF Industries
	500[5]	Covered hopper	Company shops
Chicago, Milwaukee, St. Paul & Pacific	100[6]	Covered hopper	Pullman-Standard
Clinchfield	10[7]	Loader-equipped box	Pullman-Standard
	50[7]	70-ton covered hopper	Pullman-Standard
Denver & Rio Grande Western	100[8]	50-ton flat	ACF Industries
	25[8]	70-ton covered hopper	Pullman-Standard
Erie Mining Co	6[9]	22,000-gal tank	ACF Industries
Kansas City Southern	50	Flat (Piggy-back)	Pullman-Standard
Lehigh Valley	200[10]	Covered hopper	Pullman-Standard
	100[10]	Gondola	Bethlehem Steel
Louisville & Nashville	550[11]	Box	ACF Industries
	200[11]	Gondola	Pullman-Standard
	100[11]	Flat	Greenville Steel Car
	200[11]	Pulpwood	
Minneapolis, Northfield & Southern	2[3]	50-ton PS-1 box	Pullman-Standard
Missouri Pacific	1,500[12]	50-ton box	Company shops
Norfolk & Western	3,500	70-ton hopper	Company shops
	500	50-ton gondola	Company shops
Northern Pacific	1,000	Box	Company shops
	200	70-ton ore	Company shops
Reading	400	Box	ACF Industries
	500	70-ton gondola	Bethlehem Steel
	500	70-ton hopper	Bethlehem Steel
Rutland	100	50-ton PS-1 box	Pullman-Standard
	15	PS-2 covered hopper	Pullman-Standard
St. Louis-San Francisco	400	70-ton gondola	Pullman-Standard
	500	Hopper	Pullman-Standard
	800	Box	Pullman-Standard
	100	70-ton flat	Company shops
	100	Woodrack	Company shops
	100	70-ton covered hopper	
Seaboard Air Line	500[13]	70-ton hopper	Pullman-Standard
	300[13]	70-ton phosphate	Bethlehem Steel
	200[13]	70-ton gondola	Magor Car
Southern Pacific	6,600[14]	Box	
	1,550[14]	Gondola	
	1,000[14]	Hopper	Mostly company shops
	500[14]	Covered hopper	
	1,050[14]	Flat	
Union Pacific	1,300[15]	50-ton box	Company shops
	400[15]	70-ton covered hopper	Company shops
	300[15]	70-on flat	Company shops

ICC Insists It Can Make Rules for "Multiple Units"

Hudson & Manhattan contentions that the Locomotive Inspection Act does not apply to multiple-unit equipment have been rejected by the ICC.

In a recent report by Comissioner Clarke, the commission considered the contentions and supporting evidence and concluded that H&M's multiple-unit cars are included within that act's definitions of a locomotive. The report was the first report on further hearing issued by the commission's Division 3 in Ex Parte No. 179, the proceeding in which the commission prescribed rules and instructions for inspection and testing of multiple-unit cars.

The further hearing also involved the petition of H&M for relief from some of the rules, and the joint petition of the New York Central, Long Island, Lackawanna, Staten Island Rapid Transit, Illinois Central, New Haven, Pennsylvania and Reading for modification of the inspection-frequency rule to require inspections every 60 days instead of every 30 days. The commission denied the petition.

The H&M petition for relief was denied with respect to most of the rules involved, but the commission did grant it as to the rule relating to the manner in which trucks must be fastened to the unit body. It also granted H&M conditional relief from Rule 91.419 which stipulates that no part or appliance of the unit, except wheels, contact shoes, and train stop or signal devices shall be less than 2½ inches above the top of the rail.

The relief accorded authorizes a 2-inch clearance presently in service—"where physical limitations of wheels and gear cases will not permit a clearance of 2½ inches between the bottom section of the gear case and the top of the rail."

New Facilities

AAR Research Center.—Construction of new $500,000 engineering research building at AAR Research Center, Chicago, was begun last month. It will house research work on track and track components and provide space for two axle-fatigue-testing machines now at Canton, Ohio. The latest

OF THE DECEMBER ISSUE

FREIGHT CAR ORDERS—*Continued*

Wabash	100[17]	70-ton covered hopper	Pullman-Standard
Western Maryland	300[18]	70-ton hopper	Bethlehem Steel
	50[18]	50-ton flat	Greenville Steel Car

FREIGHT-CAR INQUIRIES

Reading	1,000	55-ton hopper	
	500	70-ton hopper	
	400	70-ton gondola	

PASSENGER CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Boston & Maine	3[19]	Rail diesel (RDC-1)	Budd
Chicago, Rock Island & Pacific	25[20]	Baggage	ACF Industries
Northern Pacific	10	Baggage	Pullman-Standard
	5	Parlor-bar-lounge	Pullman-Standard

LIGHTWEIGHT TRAIN ORDERS

Road	*No. of trains*	*Type of train*	*Builder*
Boston & Maine	1[21]	Talgo	ACF Industries

[1] Delivery to begin early next summer.
[2] To be built in two sections, permanently coupled together, with an engineman's cab at one end. UP has expressed intent of ordering two additional blocks of 15 locomotives each, according to President Arthur E. Stoddard. Cost of 45 locomotives, in excess of $38,000,000.
[3] To be roller-bearing equipped. Delivery of ACF box cars to begin November, 1956.
[4] First car to be placed in service next spring. Cars, designed jointly by the research and development and mechanical departments of the CNR, will carry eight automobiles, instead of the four carried by present automobile cars. Cars to be 16½ ft high, 10 ft 8 in. wide, and 78 ft long. Portable ramps to be provided with each unit, or located at points of handling.
[5] Deliveries to begin in the third quarter of 1956.
[6] For delivery early this year.
[7] Box-car deliveries expected third quarter 1956; covered hopper cars, March-June.
[8] Expected deliveries: covered-hopper cars, February; flat cars, April; box cars, third quarter 1956.
[9] For delivery in October 1956. Cars, described as "the largest welded tank cars ever to be built," will be mounted on all-welded underframes, equipped with roller bearings, and will be supplied to Erie Mining by the Shippers' Car Line Corporation.
[10] Hopper cars for delivery May-June; gondola cars, for delivery June
[11] For delivery late in 1956.
[12] For April delivery. Unit cost, $7,060.
[13] Authorized by St. Louis Federal District Court. 500 cars to be 50½ ft—300 with 15-ft doors and 150 with 8-ft doors. All 8-ft door cars, and 100 15-ft door cars to have DF loading devices. Remaining 1,000 cars 60 to be 40½ ft long with 8-ft doors.
[14] Deliveries expected to begin last this year.
[15] 4,900 box cars to have special-type sliding double doors with two 8-ft sections, permitting use of cars as 8-ft single-door or 15-ft double-door cars. Flat cars to be specially designed for piggyback service.
[16] To be built during 1956.
[17] Delivery expected in April.
[18] Delivery expected during second quarter of this year.
[19] To be operated as a three-car 262-passenger train.
[20] For spring delivery.
[21] For summer delivery. Mechanical details and cost not yet decided.

NOTES:

Missouri-Kansas-Texas.—MKT directors have authorized purchase of 575 freight cars at an estimated cost of over $4,500,000. Included will be 350 40½-ft box cars, 150 50½-ft box cars, 50 50½-ft damage-free-loader box cars, and 25 50-ton flat cars.

Western Pacific.—The WP board of directors has authorized purchase of 410 freight cars at an estimated cost of $3,746,000. Included in the proposed purchase are 25 55-ft 50-ton flat cars equipped with roller bearings, 10 70-ton covered hopper cars equipped with roller bearings, 100 70-ton hopper ballast cars equipped with roller bearings, 50 insulated 50½-ft box cars equipped with "Evans D-F" loaders, and 225 50½-ft double-door box cars.

addition will be the center's third major building; a fourth is planned. A special report to the AAR board estimated 55 major research projects of recent years, some of which are continuing, are saving railroads about $100,000,000 annually on equipment and facilities.

Canadian National.—Shops and enginehouses in the Newfoundland district are being modified to service diesel locomotives, because of approaching 100% dieselization.

Erie.—Meadville, Pa., has been chosen as the site for the new freight car repair shop to replace that at Dunmore, Pa., which was damaged by flood waters during Hurricane Diane.

Miscellaneous Publications

MILLING CALCULATOR.—*Cincinnati Milling Machine Co., Cincinnati 9. Price, $1.* One side of calculator, designated "Milling Set-up," is used to quickly determine spindle speeds and feed rates which are adequate for toolroom operations, job lot milling, or short production runs. On other side, "Economic Cutting Speed," a modified cutting speed can be determined which will give the minimum cost per piece for high production milling jobs.

LESSONS IN ARC WELDING.—*Hobart Trade School, Inc., Hobart Square, Troy, Ohio. Price, $1 per copy.* This 200-page book comprises the second part of the new Hobart textbook "Modern Arc Welding" and contains the complete series of 40 arc welding exercises used at the Hobart Trade School. Although prepared as a textbook for operators, this volume contains information that would be of value to those designing parts for fabrication by arc welding. Lessons covered include preliminary instruction, starting and manipulating the arc, welding common joints with bare electrodes, welding light gage sheets with coated electrodes, general welding with coated electrodes in the flat, horizontal, vertical and overhead position, pipe welding, welding cast iron, and special practices and tests. Written in an easy to understand manner with descriptive pictures, charts and diagrams.

PERSONAL MENTION

Central Vermont
St. Albans, Vt.

RUPERT D. BLATCHLEY, car shop foreman, appointed general foreman, car department.

ARTHUR E. MOSSEY appointed car shop foreman.

Elgin, Joliet & Eastern

WILLIAM R. WARE, assistant to superintendent car department, appointed assistant superintendent motive power and equipment.

Norfolk & Western

A. J. GRAHAM appointed to newly created position of diesel supervisor.

W. R. JAMES, road foreman of engines, Norfolk division, retired.

C. W. COOKES, assistant road foreman of engines, Norfolk division, appointed road foreman of engines, Norfolk division.

Pennsylvania

Road foremen of engine appointments:

Northwestern Region.—W.F. PORTZLINE-Fort Wayne, Ind.; C. W. KEEFER-Chicago.

Southwestern Region.—H. G. FULLER-Indianapolis.

Pittsburgh Region.—F. E. HOSTETLER-Pittsburgh; R. J. MACNAMARA-Altoona, Pa.; C. E. MILLER-Conway, Pa.

Lake Region.—M. S. R. OLSEN-Pittsburgh; K. M. GARN-Cleveland; E. J. JENNINGS-Columbus, Ohio.

Buckeye Region.—J. A. BOWERS-Cincinnati; C. J. SEARS-Columbus, Ohio.

Southern Pacific

N. L. MCCRACKEN, assistant superintendent motive power at Los Angeles, appointed assistant general superintendent motive power.

W. J. MCHUGH, master mechanic, Los Angeles division, appointed assistant superintendent motive power.

DRISDALE BROWN, superintendent of shops at Los Angeles, appointed master mechanic, Los Angeles division.

E. C. WAGNER, assistant master mechanic at Roseville, Cal., appointed superintendent of shops at Los Angeles.

J. K. EDWARDS, assistant master mechanic at West Oakland, Cal., appointed assistant master mechanic at Roseville, Cal.

L. H. SULTAN, diesel engineer, appointed assistant master mechanic at West Oakland, Cal.

Texas & New Orleans

H. J. BOWYER appointed superintendent of shops at Houston, Tex.

Obituary

WILLIAM A. POWNALL, former assistant to general superintendent motive power, Wabash, died at Decatur, Ill., November 25.

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Reduce Your Man-Hours

Find *all* the Cracks, Not Just Some of Them

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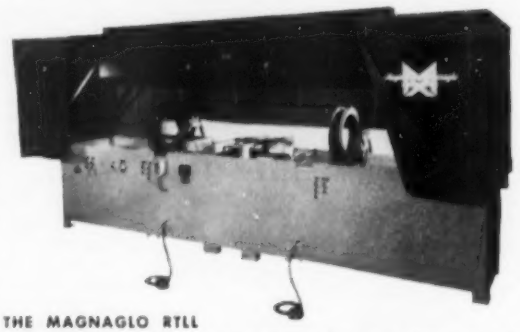
THE MAGNAGLO XRTL (above)

Designed to reduce handling in small and medium shops. Enables one man to inspect more axles with MAGNAGLO better than two men could in the past with old style equipment. A special axle supporting roller makes it easy to rotate axles. An external Magnaflux power pack used with XRTL also can be used for general shop inspection. A similar unit, the RTL, includes a built-in power pack.



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Holding fast despite vibration on shock absorber mountings . . . draft gear carriers . . . slack adjusters . . . brake cylinders . . . spring equalizer seats and pedestal tie bars, self-locking Elastic Stop nuts cut maintenance costs substantially on the DL&W modern Phoebe Snow passenger unit. Performing without failures for the past five years they eliminated the need for constant inspection and retightening. Easily removed without damage to bolt threads they can be re-used through many on-off cycles without loss of effectiveness.

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☐ Here is a drawing of our product. What self-locking fastener would you suggest?

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SUPPLY TRADE NOTES

SKF INDUSTRIES.—*Edwin R. Broden*, executive vice-president, succeeds *Richard H. DeMott* as president and chief executive officer.

■

JOHN D. DICKINSON, for the past 28½ years employed by Lima Locomotive Works, Inc., Lima-Hamilton Corporation and Baldwin-Lima Hamilton Corp. has resigned. Mr. Dickinson, who was eastern locomotive sales representative of the latter corporation at the time of his resignation, is establishing his own business as a manufacturers' agent calling on railways in eastern territory.

■

HUCK MANUFACTURING COMPANY.—*Donald R. Helson* has been appointed assistant sales manager at Detroit.

■

D. V. Hamilton

GRIFFIN WHEEL COMPANY.—*Douglas V. Hamilton* has been elected vice-president and general manager.

■

V. J. Niederriter

FAIRBANKS, MORSE & CO.—*V. J. Niederriter*, has been appointed manager of the railroad products department, Railroad Division, at Chicago. He succeeds *William G. Herzig*, who has resigned to take a special assignment with the Chicago branch of the corporation.

(*Continued on page 76*)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of September 1955	Month of September 1954	9 months ended with September 1955	9 months ended with September 1954
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	6,004	5,693	48,602	56,182
3-06	Total, Diesel-electric	35,899	32,262	316,720	289,287
3-07	Total, electric	807	657	6,701	5,809
3-04	Total, locomotive-miles	42,944	38,823	373,993	352,479
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,739	1,512	14,887	13,423
4-06	Empty, total	912	843	8,197	7,887
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	13,970	12,675	112,378	112,341
6-02	Total in oil-burning steam locomotive trains	3,009	2,234	18,870	20,253
6-03	Total in Diesel-electric locomotive trains	103,255	89,771	895,272	798,439
6-04	Total in electric locomotive trains	2,411	2,010	20,409	17,844
6-06	Total in all trains	123,381	106,794	1,053,438	952,965
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.03	1.02	1.02	1.02
10-02	Loaded freight car-miles	43.6	41.7	42.8	40.7
10-03	Empty freight car-miles	22.8	23.3	23.5	24.0
10-04	Total freight car-miles (excluding caboose)	66.4	65.0	66.3	64.7
10-05	Gross ton-miles (excluding locomotive and tender)	3,091	2,947	3,025	2,895
10-06	Net ton-miles	1,434	1,329	1,370	1,280
12	Net ton-miles per loaded car-mile (M-211)	32.9	31.9	32.1	31.4
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	65.6	64.2	64.5	63.0
14	Averages per train hour (M-211):				
14-01	Train miles	18.3	18.4	18.7	18.8
14-02	Gross ton-miles (excluding locomotive and tender)	55,879	53,739	55,858	53,780
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	48.5	42.9	46.6	42.2
14-02	All	46.2	40.2	44.0	39.8
15	Average net ton-miles per freight car-day (M-240)	998	822	910	788
17	Per cent of home cars of total freight cars on the line (M-240)	41.1	51.4	46.3	53.

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	1,384	1,919	12,841	20,996
3-06	Diesel-electric	19,601	20,548	182,419	187,926
3-07	Electric	1,251	1,322	11,790	12,569
3-04	Total	22,236	23,789	207,056	221,422
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	230,071	241,007	2,117,255	2,223,760
4-09	Total in coal-burning steam locomotive trains	7,972	9,442	72,818	103,280
4-10	Total in oil-burning steam locomotive trains	4,093	7,895	30,397	70,612
4-11	Total in Diesel-electric locomotive trains	203,461	209,016	1,871,074	1,903,442
12	Total car-miles per train-miles	9.91	9.75	9.83	9.67

YARD SERVICE (DATA FROM I.C.C. M-215)

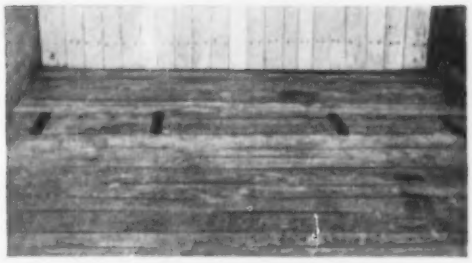
1	Freight yard switching locomotive-hours:				
1-01	Steam, coal-burning	319,905	278,585	2,540,181	2,803,252
1-02	Steam, oil-burning	55,274	53,642	434,070	487,637
1-03	Diesel-electric[1]	3,650,359	3,228,035	32,042,785	29,388,911
1-06	Total	4,031,993	3,567,920	35,075,736	32,760,039
2	Passenger yard switching hours:				
2-01	Steam, coal-burning	7,540	9,265	77,027	108,229
2-02	Steam, oil-burning	5,777	6,375	46,714	45,076
2-03	Diesel-electric[1]	238,077	244,703	2,195,557	2,286,700
2-06	Total	277,185	284,205	2,551,143	2,672,722
3	Hours per yard locomotive-day:				
3-01	Steam	7.0	4.8	5.6	4.8
3-02	Diesel-electric	16.0	14.8	15.5	14.9
3-05	Serviceable	15.7	14.4	15.2	14.4
3-06	All locomotives (serviceable, unserviceable and stored)	14.2	12.3	13.5	12.3
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.62	1.65	1.64	1.70
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.74	.73	.75	.74

[1]Excludes B and trailing A units.

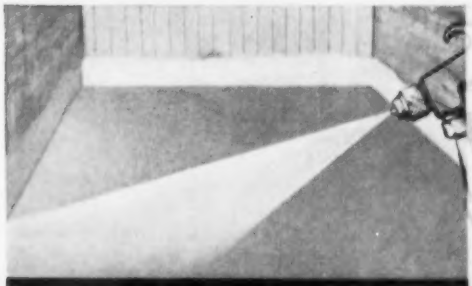
SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off hot terminals because of division hot boxes: System	Foreign	Total	Miles car set off
September, 1951	2,925,571	6,472	13,565	20,037	146,008
September, 1952	2,931,130	7,536	13,608	21,144	138,627
1953					
September	2,822,222	6,083	10,195	16,278	173,376
October	3,042,558	3,863	6,493	10,356	293,796
November	2,788,773	1,987	3,404	5,391	517,301
December	2,656,063	1,581	2,550	4,131	642,958
1954					
January	2,583,485	3,082	3,797	6,879	375,561
February	2,445,214	2,953	4,066	7,019	348,370
March	2,658,757	2,196	3,637	5,853	455,813
April	2,570,518	3,079	5,149	8,228	312,411
May	2,713,511	4,416	6,510	10,926	248,353
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,234	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232
December	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649

Now...



BEFORE ▼ AFTER



A PROTECTIVE COATING

FOR BOX CAR INTERIORS THAT LASTS INDEFINITELY

ARMORTEX

UPGRADES ANY CAR INTERIOR TO MEET HIGH TARIFF LADING REQUIREMENTS

- **SMOOTH, TOUGH SURFACE—EASILY SWEPT OR WASHED OUT**
- **ADHERENT**—a mastic which bonds to surface. Not a strippable material
- **FLEXIBLE**—tough, but not brittle. ⅛" film will bend around 1" mandrel
- **SOLVENT RESISTANT**—unaffected by mineral spirits, water or gasoline. Wood color of film will not stain or discolor
- **NON-HAZARDOUS**—an oil-in-water emulsion. Presents no fire hazard in storage or application.
- **INSECT RESISTANT**—[illegible] of synthetic resin and mineral fillers—absolutely impervious to insects.

Here's really big news the whole railroad industry has been waiting for! Now, for the first time, it is possible to apply a quick, economical protective coating to box car floors and walls which insures the *permanent,* superior surface needed for shipment of high grade bulk commodities such as grits, flour, sugar and grain.

Armortex, an amazing new discovery of the J. W. Mortell Railroad Division, completely eliminates the costly preparation of cars for individual loadings. Internal car surfaces coated with Armortex no longer splinter or deteriorate under normal operating conditions . . . thus resulting in a reduction of claims due to leakage, infestations, package damage.

Still another big advantage of new Armortex is its ease of application. One man can cover a box car floor in less than 30 minutes . . . readying the car for service the next day. By spraying, brushing or troweling, Armortex can be applied at any shop, rip-track or siding without returning the car to a central maintenance location.

Write today for free illustrated booklet giving full details on Armortex

JW Mortell COMPANY
KANKAKEE, ILLINOIS

Serving American Railroads Since 1895

SEND COUPON TODAY!

J. W. Mortell Company
550 N. Hobbie Ave.
Kankakee, Illinois

Please send me FREE copy of Bulletin Q-55

Name_____

Company_____ Position_____

Address_____

City_____ State_____

Time

. . . rides on your side with

Streamlite HAIRINSUL

LOW CONDUCTIVITY . . . Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity —.25 btu per square foot, per hour, per degree F., per inch thick.

LIGHT WEIGHT . . . Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.

PERMANENT . . . Does not disintegrate when wet, resists absorption. Will not shake down, is fire-resistant and odorless.

EASY TO INSTALL . . . Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall sections between fasteners.

COMPLETE RANGE . . . STREAMLITE HAIRINSUL is available ½" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings available.

HIGH SALVAGE VALUE . . . The all-hair content does not deteriorate with age; therefore has high salvage value. No other type of insulation offers a comparable saving.

. . . because time has yet to destroy or impair the high insulating efficiency of *Streamlite* HAIRINSUL

Even after twenty or more years of service, STREAMLITE HAIRINSUL has been removed from refrigerator cars and re-used in new cars without need for further processing or renovating.

STREAMLITE HAIRINSUL, the all-hair insulation that actually weighs 40% less and gives so much more in efficiency and economy is a one-time investment.

At left are still more reasons why leading car builders demand STREAMLITE HAIRINSUL for efficient insulations. Write for complete data.

MERCHANDISE MART, CHICAGO 54

SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED

Why NATIONAL brushes are

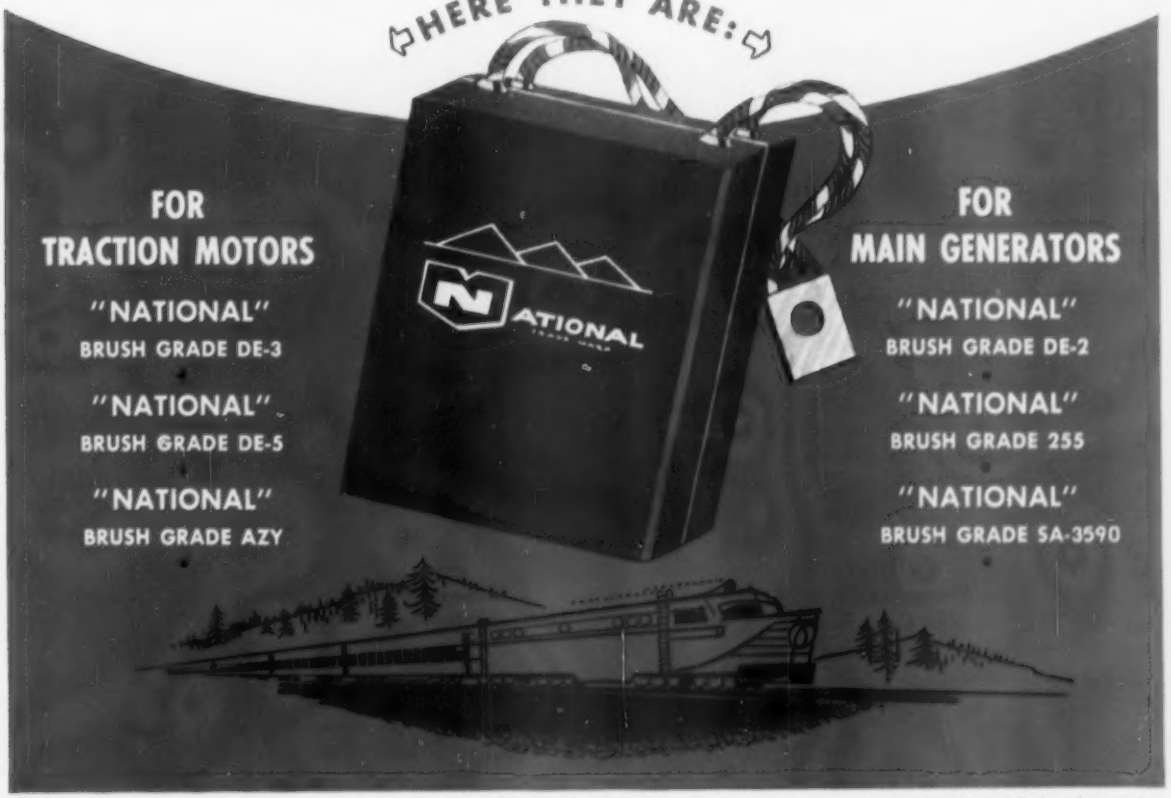
TRADE-MARK

APPROVED

by leading manufacturers of diesel-electric locomotives

"National" carbon brushes assure *top performance* and *economy*. This is due to a continuing railroad-brush-development program, in cooperation with leading locomotive manufacturers, which has resulted in much longer brush life and improved commutator condition in actual railroad operation.

You can save time and money with approved "National" brushes. That's why more of them are used on diesel-electric locomotives than all other makes combined!



The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY • **A Division of Union Carbide and Carbon Corporation** • **30 East 42nd Street, New York 17, N. Y.**

Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada*: Union Carbide Canada Limited, Toronto

KEY TO RAILROAD PROGRESS . . . ELECTRICAL PIONEERING

G.E.'s traction system gives railroad locomotives maximum performance 3 ways

1-HIGHER CONTINUOUS TRACTIVE EFFORT

Locomotives equipped with G-E traction motors consistently prove their capacity for carrying heavier loads. That's because the GE-752 motor has 15 percent higher continuous tractive effort, at comparable gearings, than any other motor in railroad use.

2-FEWER LOCOMOTIVE ROAD FAILURES

Road failures due to generator flashover are practically unknown on locomotives equipped with G-E traction generators because of the generator's inherently high machine stability, mycalex brush-holder insulators (which unlike the porcelain insulators in other generators will not shatter during flashover), and a brush-holder shield that drastically reduces damage to the brush rigging.

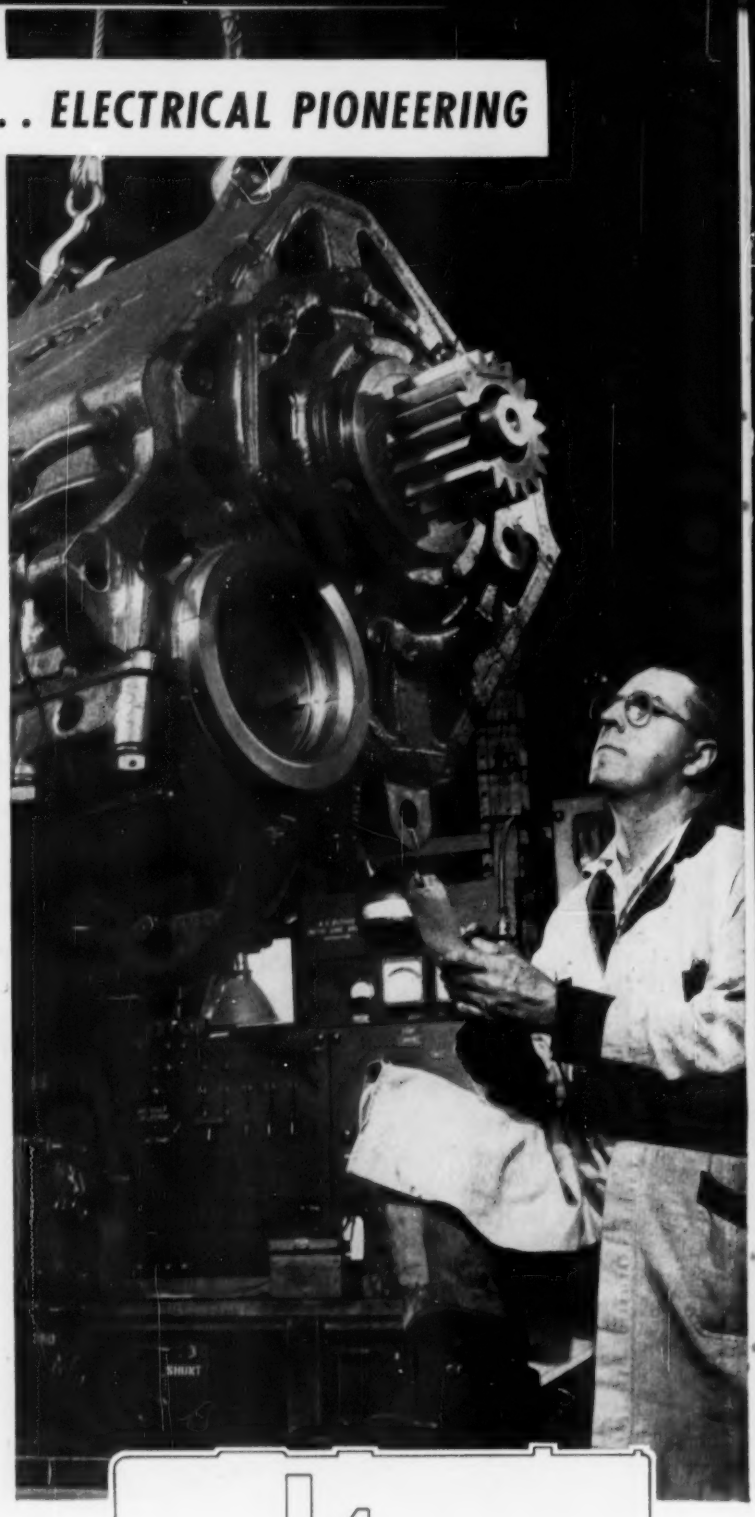
3-MINIMUM MAINTENANCE REQUIREMENTS

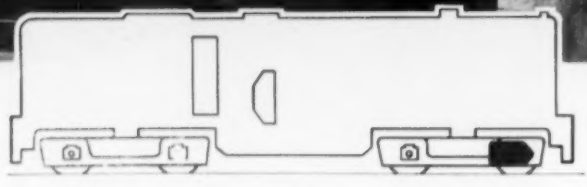
It's important to reduce or eliminate the small, continuing, and aggravating maintenance problems that occur on some control systems. In actual tests, G-E control has operated hundreds of thousands of miles in heavy mainline service with complete reliability.

Thirty years ago, General Electric supplied the first traction system—traction motors, generators and control—for the nation's first diesel-electric. Since then, G.E. has developed and is developing and perfecting other products from caboose power equipments to powerful electric and gas turbine-electric locomotives to help the nation's railroads maintain leadership in the transportation business. As the nation grows, and as the railroads grow, G-E research and engineering will be constantly at work to further railroad progress. Ask your G-E Apparatus Sales representative for more information, or write Section 135-1A, Locomotive and Car Equipment Department, Erie, Pa.

Progress Is Our Most Important Product

GENERAL ELECTRIC

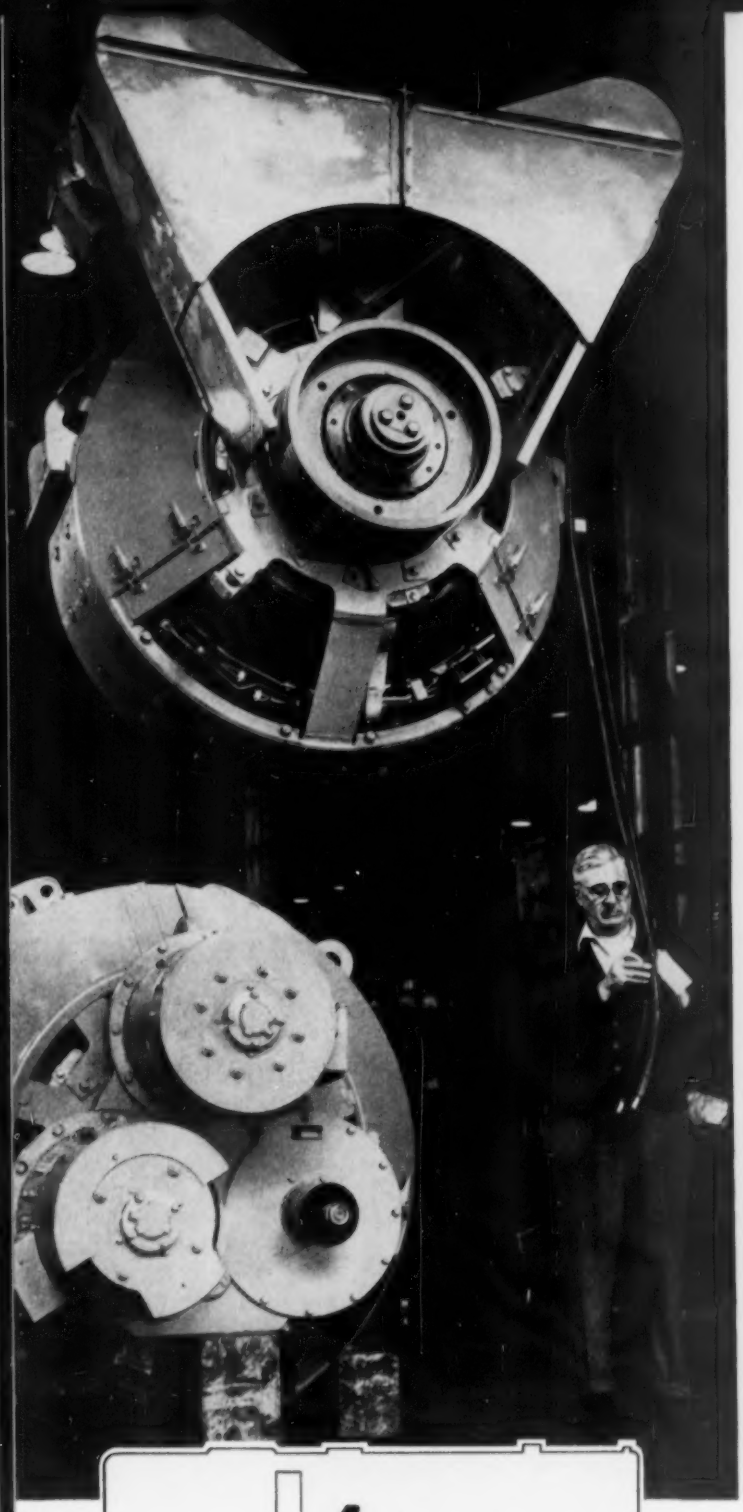


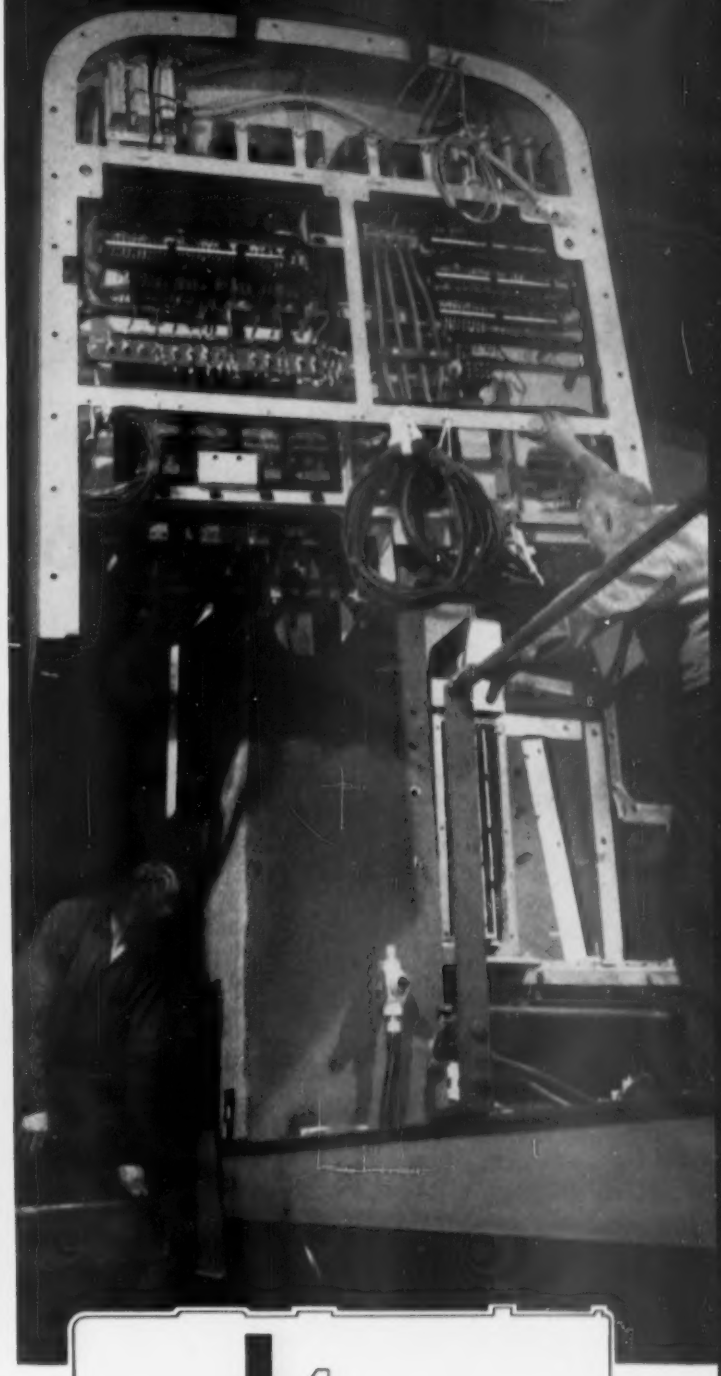


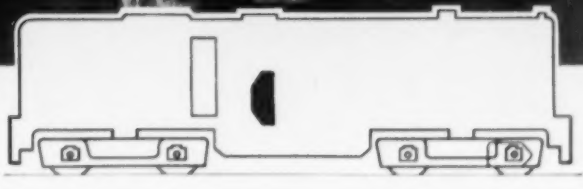
1 G-E TRACTION MOTORS GIVE YOU 15% HIGHER CONTINUOUS TRACTIVE EFFORT

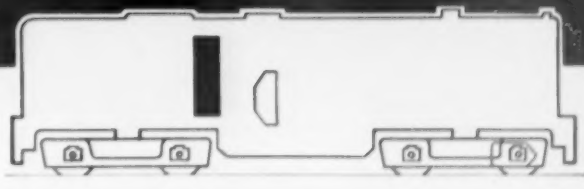
More working material in the GE-752 motor (12 percent heavier than any other motor offered for standard application) means higher ratings. The effective use of additional active copper and iron results in the most powerful traction motor available today.

GENERAL ELECTRIC









2 G-E TRACTION GENERATORS ARE BUILT TO REDUCE LOCOMOTIVE ROAD FAILURES

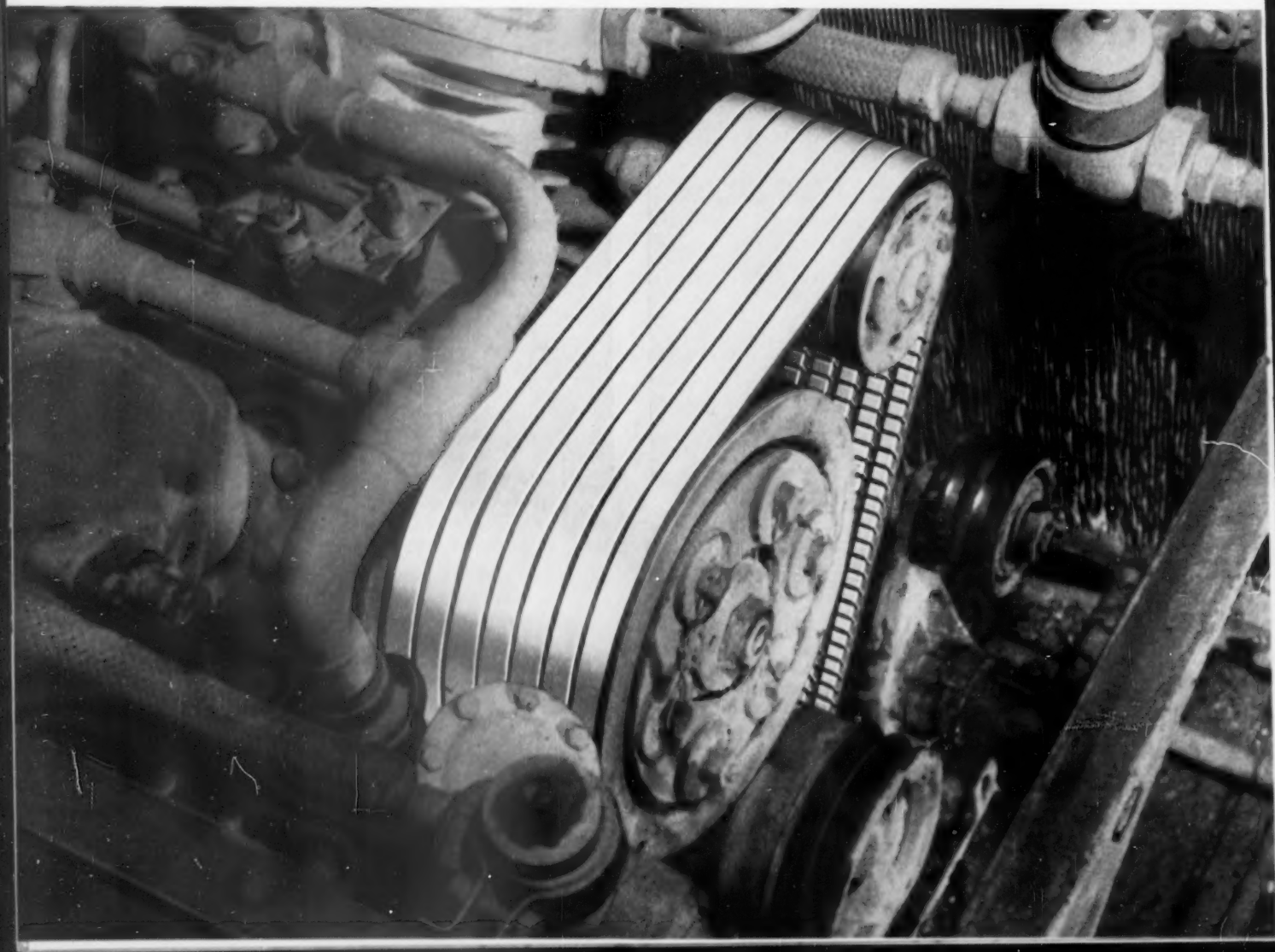
Because they are designed specifically to take flashovers in stride, G-E traction generators help protect your locomotive from frequent and costly road failures. In most cases, if a G-E generator flashes over, it simply recovers and the locomotive continues its run.

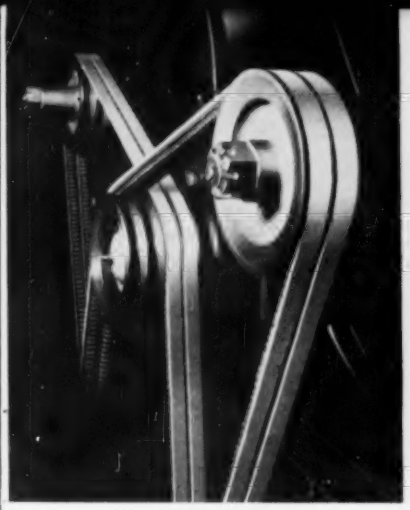
3 G-E CONTROL REQUIRES MINIMUM MAINTENANCE BETWEEN ANNUAL INSPECTIONS

G-E control is simple in construction, with fewer moving parts than other systems. In actual railroad service, locomotives equipped with G-E control have operated from annual inspection to annual inspection without a single detention being charged to the control system.

Dayton Cog V-Belts are ruggedly built of special materials processed to withstand the punishment of tougher railway service.

Major railroad cuts drive costs in half with





Dayton Endless Cog-Belts provide tremendous gripping power, have great tensile strength, amazing flexibility lengthwise and are heat and oil resistant.

Dayton Endless Cog-Belts*

Seaboard Airline reduces diesel and air conditioning drive replacement costs 50% by switching to Dayton Endless Cogs.

It all started when the Seaboard Airline Railroad called in Dayton Field Engineers to find a means of improving drive performance. A change-over to Dayton Endless Cog-Belts—stronger by over 40% than standard V-Belts—was recommended and the change was made.

Belt failures became few and far between . . . the need for maintenance and service dwindled to an all-time low . . . savings in time and labor grew to important amounts . . . replacement V-Belt costs dropped to *half* of that expended in previous years when other drives were used.

Now Seaboard Airline uses Dayton V-Belts and Cog-Belts exclusively for all diesel and air-conditioning drives as well as for all special applications.

Savings like these, experienced by almost every railroad in the country (Dayton V-Belts are original equipment on over 90% of all types of diesels) are available to your railroad, too. Why not write Dayton Rubber Co., Railway Division, Dayton 1, Ohio, and learn how you can improve performance, lower costs with Dayton V-Belts for every drive requirement.

Dayton Rubber

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*T. M.

51 YEARS OF PROGRESS

World's Largest Manufacturer of V-Belts

Specialized Railroad Representatives in New York, Chicago, Cleveland, St. Louis and San Francisco

AN IMPORTANT MESSAGE FROM THE SECRETARY OF THE TREASURY

A THREE-WAY PARTNERSHIP THAT BENEFITS EVERYBODY

How the public, the magazine publishers and the U. S. Government cooperate to help keep the nation's economy growing always stronger

AS a reader of this magazine, the chances are that you belong to a "three-way partnership" dedicated to intelligent saving and a sound economy. For you probably buy United States Savings Bonds. Nearly 40 per cent of the families in America own them. Most Bond-owning families have saved enough in this way to pay for a serious illness, to provide something for old age, to make a down payment on a house or take a long trip. And perhaps most important, these families have the wonderful feeling of security that the ownership and holding of these Bonds bring.

Americans today are buying Savings Bonds at an annual rate of more than $5,000,000,000. In the time it takes you to read this page, approximately one minute, America will buy $10,000 worth of Series E and H Bonds!

How, you may ask, did this come about?

It came about through a great program of voluntary cooperation with the Treasury Department on the part of many groups, organizations and citizens. The magazine publishers have from the beginning been among the major supporters of the Bond program. They contribute millions of dollars' worth of advertising space each year.

Full credit for making Bond-buying a national habit is due that "three-way partnership"—the American citizen, the Government, and the volunteer groups, such as the magazine publishers, who bring buyer and seller together through the pages of their publications.

All three partners will profit further by continuing to help increase the nation's saving through the sale of Savings Bonds.

For so effectively promoting the national welfare I wish, on behalf of the Government, to extend to the magazine publishers our most sincere thanks.

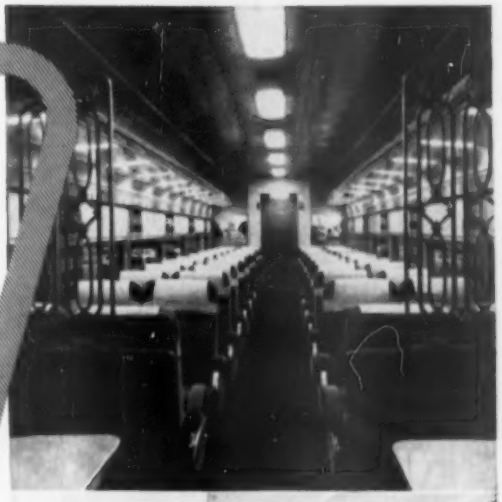
Secretary of the Treasury

Space contributed by
RAILWAY LOCOMOTIVES AND CARS

GAIN THESE ADVANTAGES with MET-L-WOOD

METAL BONDED TO PLYWOOD

for new and rebuilt Passenger Car Interiors



FAST ASSEMBLY with Met-L-Wood, whether you fabricate in your shops or use prefabricated Met-L-Wood panels made to your exact specifications.

LIGHT WEIGHT Met-L-Wood panels can reduce weight to as low as 27% of the weight of comparable steel construction.

SOUND-DEADENING value of Met-L-Wood reduces outside noise levels, and is particularly valuable as sound-isolation when used for compartment partitions and doors.

VIBRATION DAMPING effect of Met-L-Wood helps prolong car life — gives passengers extra comfort.

and Smooth, Durable Beauty!

Whether plastic, painted steel, stainless steel, or aluminum, the smooth sweep of Met-L-Wood panels adds beauty to any car interior. Tough, abuse-resisting surfaces keep car interiors new-looking for years.

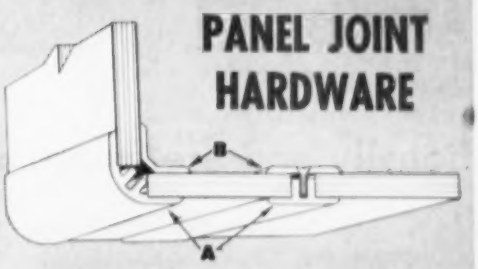
Details and technical data on Met-L-Wood panels, doors and partitions will be sent promptly on request.

Write for Bulletins 520 and 521

MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

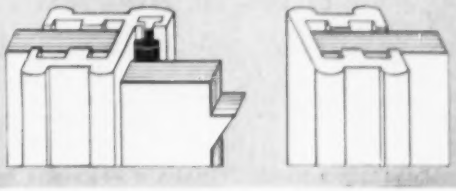
PANEL JOINT HARDWARE



Met-L-Wood panels can be joined quickly and easily with these trim extruded aluminum units. Strips A have grooved slots which provide strong threads for standard 10-24 machine screws anywhere along the length. Strips B can be drilled for screws at convenient points along the panel joint.

PANEL EDGE FITTINGS

Extruded aluminum fittings for Met-L-Wood panel edges improve partition and door appearance and give permanent edge protection. Left below is the fitting for door steps. Keyed slot holds molded rubber bumper firmly and permanently. At right is edge fitting for sliding doors and partition edges. Both fittings are easy to install on Met-L-Wood panels.



It takes **Adlake** hardware to harmonize with modern car interiors. Attractive yet practical! You'll accent

modern design with the **Adlake** line! Consider, for example: an **Adlake** ash receptacle. Or look at the modern lines of an **Adlake** coat and hat hook . . . the engraved **Adlake** service plate . . . or even the durable **Adlake** used towel receptacle. All are good functionally and are smart in appearance.

You'll find these, as well as the rest of the complete line of Adlake hardware, in good taste, of top quality and, therefore, most economical in service. Write us, today, for our catalog on hardware for railroad cars. No obligation, of course. Address: 1152 N. Michigan, Elkhart, Indiana.

Adlake — 99th year of serving the transportation, building and central industries

THE Adams & Westlake COMPANY

Established 1857 • ELKHART, INDIANA • New York • Chicago • Manufacturers of ADLAKE Specialties and Equipment for the Railroad Industry.

what good is half a wheel?

Good enough to show in cross section the soft gray iron hub metal which is easily machinable. This means faster and less costly mounting on axles.

And good enough to show the extreme hardness of the white metal (chilled iron) that gives maximum service with minimum loss of metal, and assures retention of rotundity throughout the long life of the wheel.

Production of chilled car wheels in 22 cities throughout the U. S. assures quick, low cost delivery from the AMCCW plant near you.

The improved AMCCW wheel, adopted in 1950, has a better distribution of metal from hub to flange to withstand the stresses developed under today's operating conditions. Originally a theory, backed by laboratory tests, this is now a fact backed by the performance of over five million of these wheels in service.

A spectacular reduction in failures, combined with the advantage of fewer loose chilled wheels and far less derailments charged to worn flanges, has given the chilled car wheel a safety record unequalled in freight car service.

Available locally
Short-haul delivery
Reduced inventory
Low first cost
Low exchange cost
Increased ton mileage
High safety standards
AMCCW plant inspection
Easier shop handling

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

445 North Sacramento Boulevard, Chicago 12, Ill.

Albany Car Wheel Co. • ACF Industries, Inc.
Marshall Car Wheel & Foundry Co. • Griffin Wheel Co.
Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.)

simple

The "Redipak" lubricating pad is a square block of foam neoprene, molded with cored passages and covered with cotton wicking material. It is installed—without any other packing—in the standard journal box without jacking the box.

Stop Hot Boxes!

"Redipak" Lubricating Pad points the way toward elimination of the hot box problem

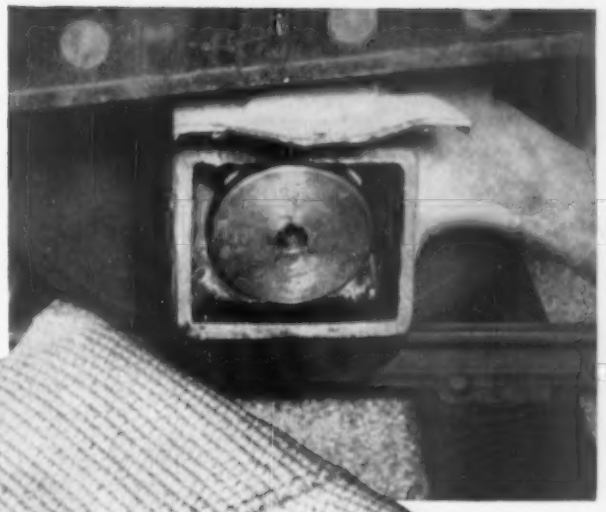
foolproof

The square "Redipak" lubricating pad is fully symmetrical—it can be installed any side out, either face up. It can be inserted by hand or with a "Redipaker"—a simple bent rod which speeds up the work—and is removed with a standard packing hook.

No waste... with "Redipak"!

cool-running

The "Redipak" lubricated bearing has operated as much as 50°F. cooler than waste-lubricated bearings, under certain conditions. In laboratory starvation tests, with no free oil in the box, the "Redipak" retained enough oil for 10,000 miles of high speed operation.



long-lasting

In service tests, "Redipak" lubricating pads have operated over 90,000 miles each, without noticeable wear. No pad has shown any sign of glazing. Inspection of the bearings shows that the pads do not lint.

AMERICAN
Brake Shoe
COMPANY

NATIONAL BEARING DIVISION
ST. LOUIS 10, MISSOURI

It's easy to

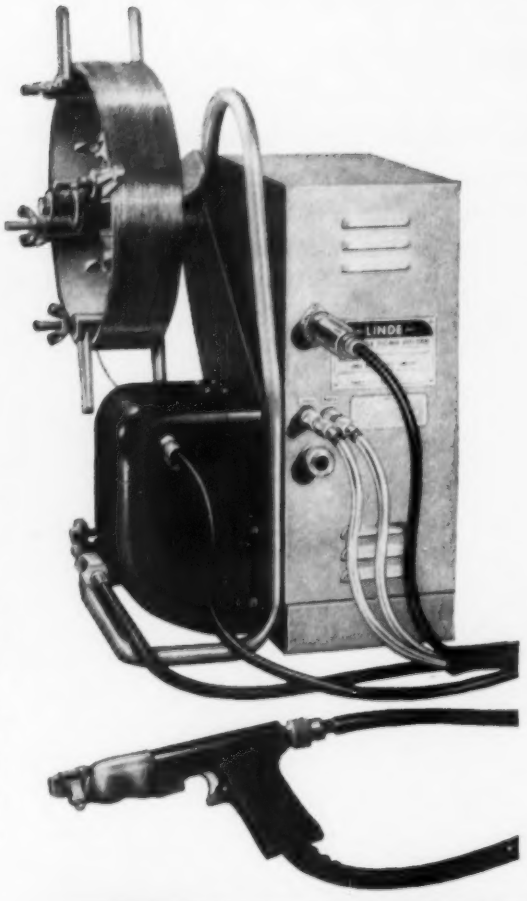
CUT WELDING COSTS

when you use a High-Speed

LINDE SWM-2

Trade-Mark

Portable Sigma Welder



Your welding department can easily make high-speed, low-cost fusion welds in aluminum, stainless steel, high temperature alloys, copper, carbon steel, and other metals with the LINDE SWM-2 Portable Sigma Welder. The LINDE SWM-2 is a complete control unit for manual sigma (Shielded Inert Gas Metal Arc) welding operations. It mechanically feeds welding wire from a coil into the weld area at a steady precontrolled rate and supplies a regulated quantity of argon to shield the weld from contamination by the atmosphere. No flux is used. In most cases the smooth, clean sigma welds need no post-welding treatment.

SIMPLIFIED AUTOMATIC OPERATION

The operator merely presses the trigger of the pistol type torch to energize the control circuit and start the flow of water coolant and argon gas. When an arc is struck by touching the consumable electrode to the workpiece, the wire feed automatically begins.

NEW CONSTANT POTENTIAL POWER SUPPLIES CAN BE USED

Either ordinary or constant potential DC power supplies can be used with a LINDE SWM-2. In constant potential welding arc voltages are preselected and held with outstanding consistency which permits positive starts and high-speed welds on thin metals.

Call your nearest LINDE office today for more information on how you can cut production welding costs with the LINDE SWM-2 Sigma (Shielded Inert Gas Metal Arc) Welder. Or write for your free LINDE SWM-2 catalog.

Production jumped 300% when the Heller Engineering and Manufacturing Company, Lynwood, California changed to sigma welding to fabricate aluminum engine shipping stands. Because the sigma welds were clean and sound, post-welding treatment was practically eliminated.

RAILROAD DEPARTMENT

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

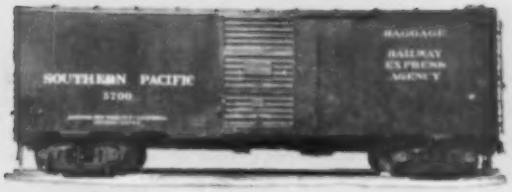
In Canada: LINDE AIR PRODUCTS COMPANY

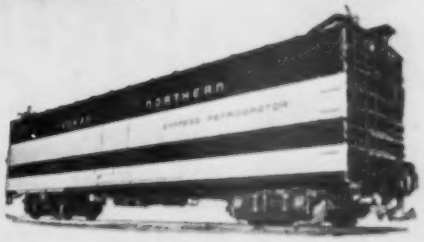
Division of Union Carbide Canada Limited, Toronto

(formerly Dominion Oxygen Company)

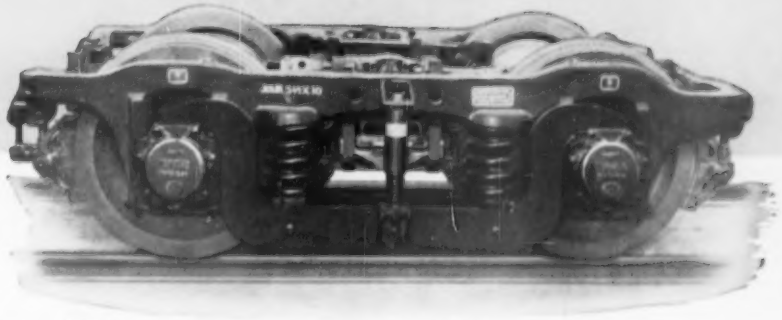
The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol . . .





Easy on Lading and Car!



Easy on Track and Roadbed!

Commonwealth BX Truck
Furnished for clasp brakes or single shoe brakes

Smooth Riding Commonwealth BX Trucks Reduce Damage Claims

For all types of commodity cars operating in high speed service, COMMONWEALTH BX Trucks assure safe, smooth performance, greatly reducing damage to lading, car body and track structure. They are accepted for operation in all high speed passenger trains without exception.

COMMONWEALTH BX Truck design incorporates in a simplified arrangement many of the fundamental features of passenger car trucks such as equalization, swing motion and one-piece cast steel truck frame with pedestals cast integral to insure perfect alignment of wheels and axles.

For outstanding protection to lading, cars and track, and for most economical operation with minimum upkeep costs equip your head-end cars with COMMONWEALTH BX Trucks.

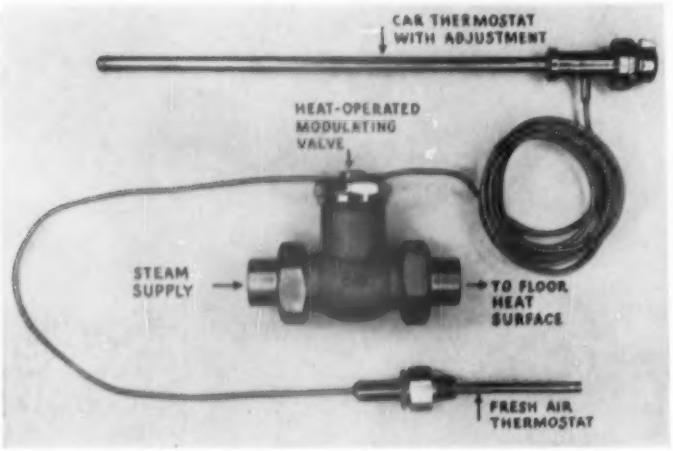
GENERAL STEEL CASTINGS

GRANITE CITY, ILL. EDDYSTONE, PA.

Only 3 Simple Elements

make Sylphon Non-Electric Heat Control System

MOST DEPENDABLE



NO

—electric thermostats
—relays
—solenoids
—motors
—fuses

GET MORE DEPENDABLE CAR HEATING by eliminating as many potential causes of service interruptions as possible, such as *defective electrical thermostats, electrical grounds, short circuits and blown fuses.* That means a *non-electric* control system — Sylphon — used since 1936 by railroads in all parts of the United States and Canada.

Here's how the simple and reliable Sylphon control works: The adjustable, liquid-filled *car thermostat* is set for any desired temperature. Should the car get warmer, pressure from expanding liquid in the thermostat expands a bellows inside the modulating valve, reducing or shutting off the steam supply to the floor heaters. When car temperature drops, a reverse action takes place; backflow to the thermostat relieves pressure in the bellows and opens the valve a requisite amount.

The *fresh-air (outside) thermostat* has compensatory functions, one of which is to lock out the heating system in warm weather.

The Sylphon Heat Control System is foolproof; being operated by the steam heat itself rather than an accessory electric system, it *must* work at all times.

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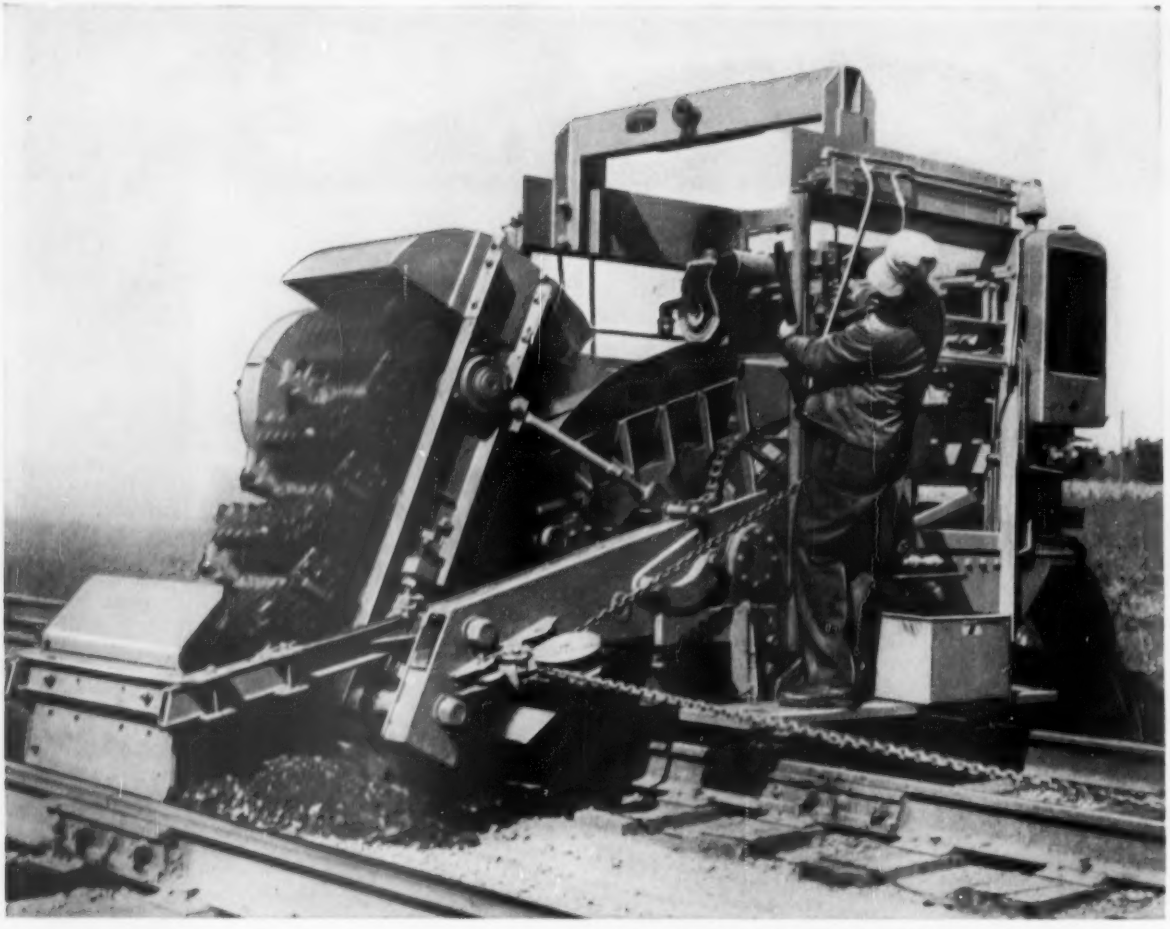

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EDITORIALS . . . . . .

The New Safety Rules— Can They Be Made More Flexible?

With the many proposed revisions of ICC Rules currently under appraisal and discussion, it may be a good time to question one basic characteristic of safety regulations generally as applied to railroads. Are these rules too rigid? Can they be made more flexible? Can they be formulated so as to recognize at least some of the vast differences in the types of service and operations which they cover—such as a passenger locomotive making 25,000 miles a month in high-speed service and a road switcher making only a couple thousand miles a month in low-speed local freight service? Should monthly inspection requirements, for example, apply impartially to such extremes?

What are the possibilities in car regulations? While interchange necessitates certain standards there are many areas in which procedures can vary. Take a car that develops a defect en route. Movement to a repair point may now be made only upon the line on which the defect developed. No doubt this is a good rule for the majority of cases. But is it best for all cases? Should a regulation of this nature apply the same way to an eastern trunk line in densely populated territory as it does to a western road operating through sparsely populated territory with rip tracks five times as far apart and depending upon mobile trucks to handle emergency repairs between such rip tracks?

Similarly, in interchange, a load that can safely go to destination on a 10-mile transfer run at low speed as part of a 15-car transfer cut on a belt line might not be at all acceptable in the middle of a 100-car freight about to run the next 125 miles at 60 mph. Yet the rules as written today apply with equally stringency to conditions that are widely divergent.

This, like the locomotive example, makes an interesting contrast with equivalent regulations for air lines. These rules have the flexibility necessary to recognize both progress and differences in operating conditions. Only 15 years ago, allowable flight time between engine overhauls was 200 hours. Today, when an air line first gets its CAA certificate to operate it must overhaul engines after each 600 hours of flight time. If both inspections and operating results indicate that this may safely be extended, the overhaul period is increased by 100-hour increments to as much as 1,200 hours.

Could the railroad rules be made similarly flexible to allow for different operating conditions and for design improvements that occur as time goes by? Should they be written to set up broad limits—with a good deal of discretion given to the inspector to change rules within prescribed limits on the basis of past results on a given road, or on the basis of what the inspector thinks is necessary, judging from the characteristics of the property and the operating conditions (grades, curves, stops, speeds, etc.)? Or should some other procedure be instituted to set the precise ruling for the individual road or set of conditions?

Where a rule applies to all conditions on all roads and is safe for the toughest operating conditions, it must be overly restrictive for the average condition. While some risk is necessarily involved in revising a proven safety regulation, it is difficult to conceive of any changes that would be made by a competent body of men that would involve a greater risk than where aircraft engine flight time between overhauls is lengthened on a trial basis.

There does of course remain the question of whether the added flexibility would be worth the added complexity. That is something we probably won't know until we at least try to formulate suggestions for more flexible regulations. The possible benefits that can be foreseen would appear to justify just such a trial.

Road Switchers Pull Ahead

Most roads have them. Over two thirds of the diesel units ordered during 1955 were road-switcher, all-service or general-purpose locomotives. Orders for carbody type units are coming less and less frequently as the road switcher does the mopping-up job to complete dieselization on many lines. This versatile design goes back only about fifteen years. Only since the end of World War II have these units been built in large numbers. Since 1950 their numbers have rocketed upward as orders for other types of road power have fallen. Horsepower has increased and steam generator capacity has gone up. Multiple-unit control is almost universal now.

The versatility of such a unit far outweighs any inconvenience that the crowded hood presents for easy maintenance of the diesel and electrical equipment and the steam generator. An increasing number of units built for export, and a growing number of foreign-built locomotives use the narrow hood with the engine and steam generator compartments flanking a cab well toward one end of the locomotive. The electric locomotives ordered in 1955 are to be road switchers, and some early carbody-type units are now being rebuilt into road switchers. There is every indication that there will be many more in the future. The styling of early road diesel locomotives is disappearing so that the railroads can have a real universal motive power tool.

Texaco Lubrication Engineers on the Job . . .

Throughout the 48 States, Texaco Lubrication Engineers—experienced railroad men—are helping in a thousand ways to improve railroad operation. Their recommendations on the proper selection and application of famous Texaco Railroad Lubricants have resulted in truly outstanding efficiency records.

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1 Texaco Lubrication Engineers check proper application of *Texacoat* for journal protection.

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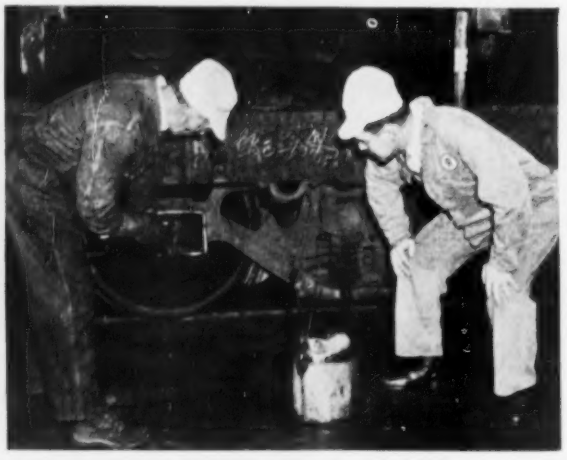

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Letters to the Editor

Training Apprentices

TO THE EDITOR:

First, let me say that I find your magaine both interesting and educational.

I am an Erie railroad car inspector, having served a four-year apprenticeship. As you know, the responsibilities of carmen and inspectors continue to grow and this calls for better trained personnel. Therefore, I am writing the following suggestions for apprenticeship improvement which, I think, should tend to produce a better trained carman, assuming that most railroads conduct their apprenticeship systems like the Erie. You may pass these suggestions on to your readers if you think it or the suggestions worth while.

1. Along with the on-the-job training, my railroad requires an apprentice to take the Railway Educational Bureau Correspondence course. This involves two lessons a month dealing with such as air brakes, etc. The railroad should see that these lessons coincide with what the student is currently learning on the job. This never occurred when I was training and it is vexing to work at one thing during the day and study something different at night. Also, most of the value of the lessons is lost.

2. An apprentice was supposed to be rotated every six months. However, through one thing or another, this was not always the case. The rotation rule should be strictly enforced. For years can pass very quickly.

3. An apprentice should be examined each six months' period on that phase of training just completed. This examination should be given by the immediate foreman or someone higher, if possible.

An apprentice might become lazy if he knows he can move on to the next step without anyone asking what he learned.

4. Assign apprentices only to mechanics who will show an interest in teaching them.

I found indifference and, sometimes, downright beligerence towards students during my four years. This makes it impossible to learn.

5. A carman apprentice should serve time with a good car inspector.

This is not usually done because of the belief that a man who can repair cars should have no trouble inspecting them. However, problems confront car inspectors that shopmen never meet and here only experience will prevail.

Edward Devlin.

New Books

BRAZING MANUAL. By Committee on Brazing and Soldering of the American Welding Society. This is a complete source of information on brazing—a welding process using non-ferrous filler metals which melt at temperatures greater than 800 F. Complete technical explanation is given for the eight brazing processes—torch brazing, twin-carbon arc brazing, furnace brazing, induction brazing, resistance brazing, dip brazing, block brazing and flow brazing. All types of common and rare metals are described in terms of suitable brazing techniques including equipment, precleaning, surface preparation and postbraze cleaning. Brazing fluxes and atmospheres are standardized into types according to their compositions and uses. Also included are sections devoted to design and production information, testing, safety, quality control, and causes of defects.

Reinhold Publishing Corporation, 430 Park avenue, New York 23. Price $4.75.

LOCOMOTIVE AIR BRAKES. By C. M. Drennan. This is the third volume in a series written by the retired supervisor of training of the Westinghouse Air Brake Company. The previous volumes were titled *ABC's of Air Brakes* and *Car Air Brakes*. The new volume completes coverage of the air brake field and again uses Mr. Drennan's famous "chalk talks" including simplified diagrams with photographs and explanations of equipment function. There are quizzes for assistance in self-study. Earlier locomotive equipment is described only in sufficient detail so that the principles and needs of present day equipment can be developed.

Section I includes air compressors, safety valves, feed valves, brake application valves and miscellaneous devices. Section II deals with the locomotive brake equipments and goes through the early developments and the ET equipments to the present day 6-SL and 24-RL equipment. Train control equipment is illustrated and explained. Section III describes locomotives brake equipment with electric controls, and Section IV deals with speed governor control. The book is indexed and answers to the quizzes are given.

Prices: $6.75 with reductions for bulk orders. $3.95 each when ordered in lots of over 50. $15.00 for the complete set of three volumes.

Simmons Boardman Publishing Corporation, 30 Church street, New York 7.

ELECTRIC RAILWAY ENGINEERING. By T. Ferguson. A 416-page book compiled by an author who has had 50 years experience in the field of electric traction. During his professional career, the author was in charge of general engineering work of the electric traction department of Metropolitan-Vickers Electrical Co., Ltd., and its predecessor The British Westinghouse Electric and Manufacturing Co., Ltd. The book includes 132 illustrations, but there are no photographs or constructional drawings and no space is used to describe current equipment which is constantly changing in design and is often obsolescent. The book deals rather with unchanging fundamentals and covers such subjects as motive power, traction motors, braking, train resistance, permissible speeds, adhesion, transmission and conversion, comparison between self-contained power units and straight-electric traction systems and examples of railway electrification.

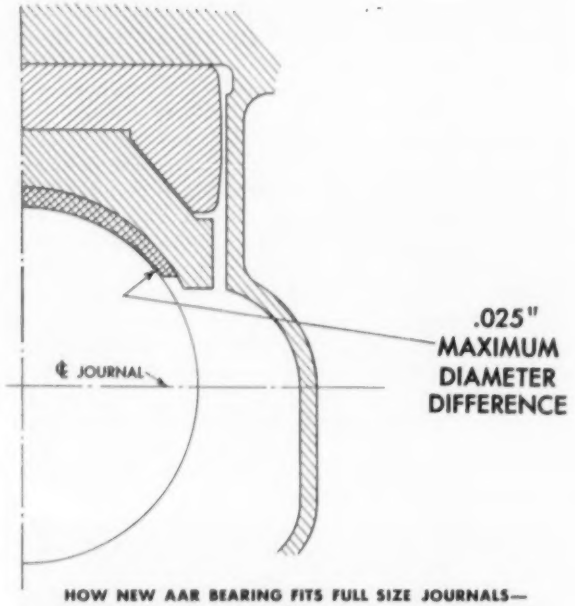
Messrs. MacDonald & Evans, Ltd., 8, John Street, Bedford Row, London W.C. 1, price $8.05 in London at present exchange rates.

New AAR Standard

"CONTROLLED CLEARANCE" freight car bearings in FULL and STEP SIZES designed to make solid bearing performance

BETTER THAN EVER!

New bearing designs, developed by AAR and made effective March 1, 1956, to provide big extra margin of safety during initial run-in period by distributing bearing load over wider area. Step sizes for undersize journals to increase bearing efficiency throughout life of axle.



HOW NEW AAR BEARING FITS FULL SIZE JOURNALS— Newly revised bore dimensions and tolerances, combined with journal tolerances, assure bearing clearance within .010" and .025". Old style bearing dimensions and tolerances permitted maximum clearance of 1/8" on full size journals and same bearing was applied to all undersize journals.

Now AAR solid bearings will get a chance to work at optimum efficiency almost as soon as they are installed. The reason: bore diameters and tolerances are greatly reduced. These new "controlled clearance" designs, combined with babbitt's high conformability, mean that you'll distribute the load evenly through the bearing crown after only a few miles operation. You'll get far greater bearing load capacity during initial operation.

But that's not all. Now the AAR has two step size bearings (below nominal) for each standard size axle to accommodate turned down journals. Here's a big step toward the same high degree of bearing efficiency throughout the life of the axle.

Up to now the average solid bearing freight car has run 12 to 15 years per road failure of a bearing. Now you can look for that good record to improve—hot boxes to go down, miles per hot box to go up. Yes, you can expect still better solid bearing performance in the future—and at the lowest possible cost. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

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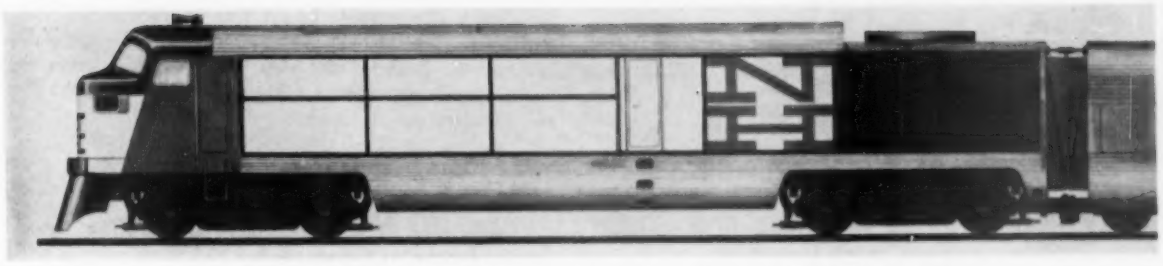
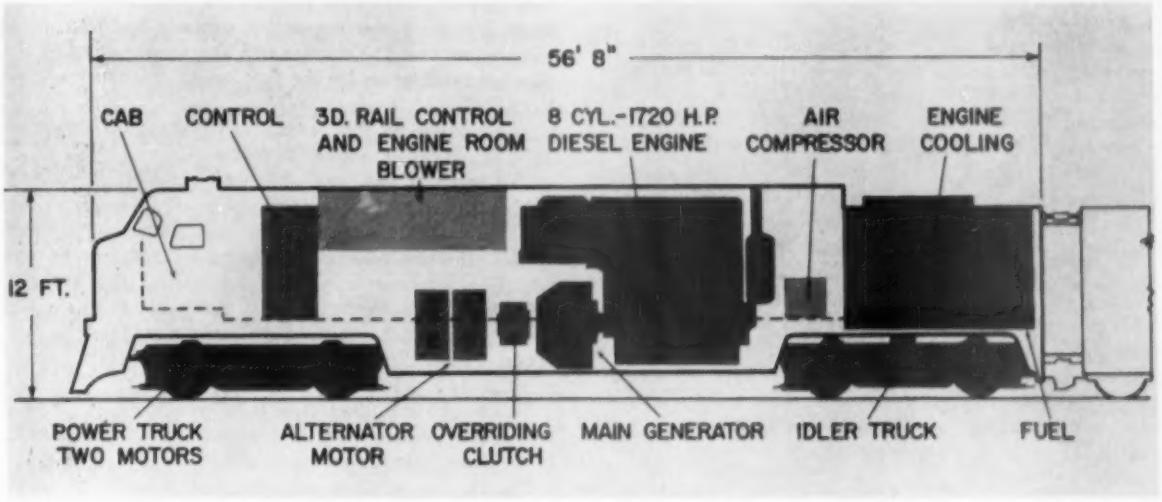


Artist's drawing of one of the Speed Merchant locomotives to be supplied by Fairbanks-Morse.



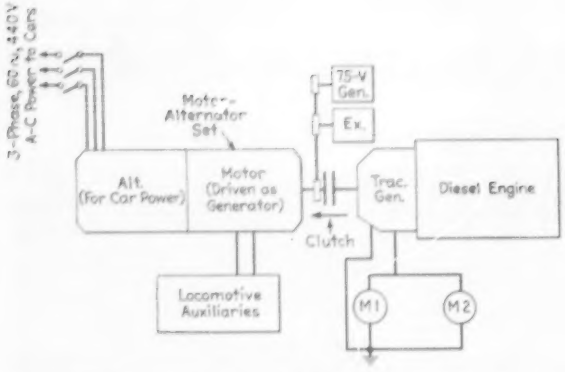
Block diagram showing arrangement of the principal components of the locomotive.

Power for New Haven Lightweight Trains

Diesel and third-rail power up to 2,400 hp for traction and 380 kw for train supply will be made available to the train by two locomotives

Locomotives for the Fairbanks-Morse-ACF lightweight trains now under construction for the New Haven were described by V. F. Dowden, electrical engineer, New Haven, Robert Aldag, manager sales engineering, Railroad Division, Fairbanks, Morse & Co., and F. L. Sahlmann, Locomotive and Car Equipment Department, General Electric Company, at a meeting of the New York Section, American Institute of Electrical Engineers, held in New York, on November 17, 1955. The following is a brief summary of the three papers presented.

The New Haven has special interest in this type of equipment because although it ranks 31st in size among the nation's railroads, 40 per cent of its income is derived from passenger train operation. Two locomotives, like the one here described, will provide motive power for one of the three different types of lightweight trains to be used by the New Haven. Specifications require that the locomotives must be light in weight, have low center of gravity, have their own diesel power plant and be capable of operation on 600-volt d-c third rail, have a maximum weight of 58,000 lb per driving axle, be capable of high-speed operation and be adaptable to m-u operation. The 440-volt, 60 cycle, 3-phase power supply for the train must be provided during both third-rail and diesel operation. Since the diesel engine is called upon to drive the head-end 60-cycle alternator,



Power flow from engine to traction motors, train power lines and locomotive auxiliaries during diesel-electric operation.

it must operate continuously at its normal rate of speed, of 850 rpm. The diesel engine drives the generator to supply power to the two traction motors in the conventional manner for diesel locomotives. With diesel operation, the locomotive auxiliaries and the head-end power supply unit are driven by the engine through an over-running clutch and from a 600-volt d-c motor, when operating in third-rail territory. The same motor functions as a generator for operating the locomotive auxiliaries during diesel operation.

The two locomotives being built, (one for each end of the train) will each produce at least 1,200 hp to the main generator for traction power and 350 hp for train heating, cooling, lighting, food services, etc. Each train will seat 430 passengers. There will be 5 cars per train, and train load is 55 kw per car. The train will be capable of maximum speeds approaching 120 mph and can maintain high permissible speeds on normally restrictive curves.

Arrangement of Apparatus

Major components of equipment are shown in the block diagram. Inside the nose are automatic air brake system equipment, cab signal warning devices, hot water cab heaters and number and marker lights. Behind the cab is the main cabinet for electrical control equipment.

The two traction motors will be mounted on the cab-end truck. Twenty-five per cent of the total train weight is on these two trucks.

Underneath the cab are two traction motor blowers. Harmful dirt, snow and water drops are removed from the air stream to the motors by a skimming principle employed in the blowers, whereby a fraction of the total air blown is skimmed off the blower periphery and exhausted to atmosphere with heavy particles of air and water.

Under the cab roof are the engine room blower and resistors. The blower makes it practicable to run the train equally well in both directions. By taking air in at the roof and pushing it through air cleaners, it is expected that the high dust concentrations at the rear end of the train will cause no difficulties.

The 8-cylinder standard 1,750-hp engine will drive a newly developed General Electric main generator. At the left of the generator is an over-riding clutch which will be closed for driving the a-c generator for car power, a 600-volt d-c generator for locomotive, auxiliaries and an amplidyne exciter when the locomotive is being driven by the engine. When the locomotive is receiving power from the third rail, the 600-volt generator will act as a motor driving the alternator with the clutch disengaged. Under this condition, the locomotive auxiliaries will be operated directly on third rail power. Back of the step on the roof line is the engine cooling system, a 600-gal fuel tank and the 3rd rail acceleration resistors.

Tight-Lock Couplers

At the rear of the locomotive is shown a special coupler for the ACF train. It is a tight-lock coupler with no vertical or angular displacement between couplers when joined. This permits using the coupler as an automatically connected conduit for two air lines, main train, 3-phase power connection contacts and 42 control circuit contacts. The coupler will also serve as part of the steering mechanism for the first single axle truck on the train.

The coupler height, instead of the standard height of 34½ in., is 20 in. above the rail.

The truck is new and of light weight. It has swing motion hangers and some springs on the outside of the truck frame with mechanisms as wide as clearances will permit, thereby raising the center of rotation to approach pendulum action and increasing the anti-roll stability of the spring system. Cross members at the ends of the truck frames have been eliminated to improve accessibility to traction motors and other equipment.

The trucks are fitted with light weight brake rigging and brake cylinders for use with the new composition brake shoes that are now available.

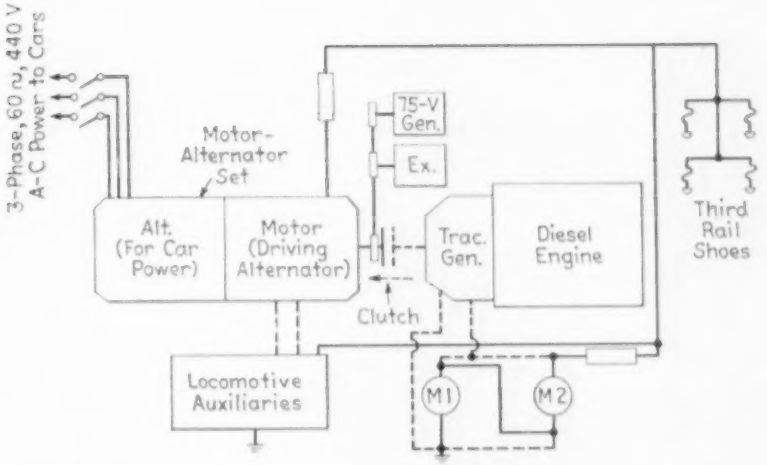
The two locomotives are designed for a 5-car, 430-passenger ACF train. Present fully loaded weight estimates indicate there will be nominally 5.7 hp per ton available for traction and a maximum of 6.8 hp per ton.

Estimated rates of acceleration indicate that the train can reach 60 mph in 2 min., 80 mph in 4½ min. and 100 mph in 14 min. The aim of its application is to reduce the time from New York to Boston to a little over three hours.

Electrical Equipment

Two GE-752 motors are used for traction purposes on each locomotive. For third-rail applications, the standard motor is slightly modified by the addition of a ground return current path to bypass the 600-volt propulsion current around the locomotive journal bearings. Another addition is a flash ring assembly designed to protect the motor armature bearings by directing flashover currents to ground through the ring.

For diesel-electric operation, the traction motors are connected two in parallel on full and shunted field. The traction generator is a conventional separately-excited, shunt-field machine with a series starting winding for cranking the engine from the battery. However, the means of excitation differs radically from that used on



Power flow from third rail to traction motors, train power lines and in electrified zone. Dotted lines show disengaged clutch and circuits not used.

conventional diesel-electric locomotives. Because the diesel engine must operate continuously at full rated speed in order to provide nominal 440-volt, 60-cycle power for train auxiliaries. This means that the traction generator operates at 850 rpm and all control for traction must be provided in 8 steps by field control through the amplidyne exciter.

When starting the train, the engineman operates a throttle handle in the conventional manner. The controller progressively increases the amplidyne excitation and, through its output, the main generator excitation.

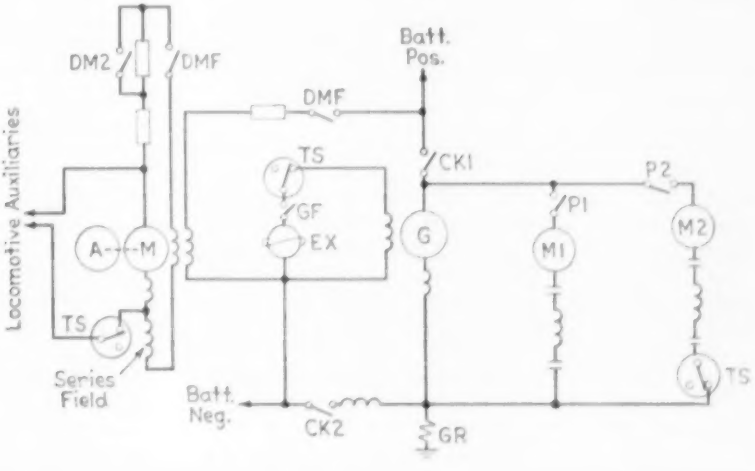
In this system a single engine, under the control of a constant-speed governor with a maximum fuel stop to limit engine horsepower, drives both the main traction generator and the alternator which supplies the varying auxiliary load in the cars.

To limit the maximum power to the traction motors, a simple current relay operating from a current transformer in the alternator output lead is used as an approximate measure of the a-c generator auxiliary load. When the current drops below a certain minimum value, indicating that the auxiliary load in the train is low and the power available for traction is excessive, the relay operates. This reduces the maximum fuel rack setting from 1,720 hp. With this lower setting and normal locomotive auxiliary power requirements, the net power to the generator for traction is within acceptable limits. When the governor fuel rack is at the 1,720-hp setting, the net power available for traction will vary depending upon auxiliary loads, but normally there will be a comfortable margin over the rated 1,200 horsepower. Conventional wheel-slip control is provided. Ground protection is provided by means of a conventional ground relay.

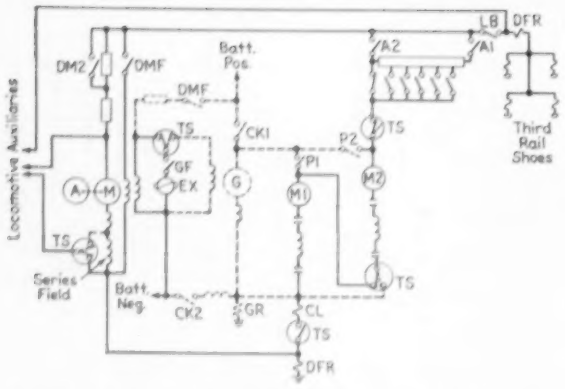
For third-rail operation, the traction motors are connected two in series, full field only. Acceleration is by means of blown series resistors in 12 steps, all of which have ratings suitable for continuous operation. Notching is automatic; but under the control of the engineman, who may vary the rate of acceleration with the same throttle handle used for diesel-electric operation.

When operating from the third rail, ground protection is provided by means of a differential ground relay, having two series coils, one carrying total current from the third rail, and the other total ground current. If these are not equal, the relay will operate and trip the line breaker.

A motor-operated accelerating controller is used for third-rail operation. In conjunction with current relay,



Simplified diagram of propulsion circuits for diesel-electric operation.



Simplified diagram of propulsion circuits for third-rail operation. Dotted lines indicate circuits which are not used when power is taken from the third rail.

it automatically notches up until the traction motors are on full third-rail voltage. Its operation is under the control of the engineman by means of the throttle handle on the master controller.

The same locomotive master controller is used for both diesel-electric and third-rail operation. The throttle handle has eight positions, as in the conventional diesel-electric locomotive, and there is a separate lever to control forward and reverse movement.

Third Rail Transfer

When transferring from third-rail to diesel-electric power, the motor-alternator set will be running at between 850 and 900 rpm, and the throttle will be in one of the operating positions for third-rail power. The traction motors will be in series on full field. Preparatory to changing over, the diesel engine must be started by cranking with the main generator running as a series motor from the 75-volt battery. After the engine has started and operated at idle speed long enough to circulate oil and water, it is brought up to its normal operating speed of 850 rpm and is then ready to take load.

The engineman then moves the throttle handle to *IDLE*, and throws a control switch from third-rail operation to diesel-electric operation. Among other things, this disconnects the large d-c motor from third-rail power.

The motor-alternator set starts to slow down, but the moment its speed drops to 850 rpm, the free-wheeling clutch engages. This drives the d-c machine and the alternator, as well as the exciter and auxiliary generator, from the engine.

Power and auxiliary equipment circuits are switched by a multi-contact transfer switch similar to the dynamic braking set-up switch frequently used on conventional diesel-electric locomotives. Circuits are interlocked so that no change can take place until the throttle has been moved to the *IDLE* position. This assures a smooth transfer under the control of the engineman. As the throttle is advanced after transfer, it controls the excitation of the main generator.

In changing from diesel-electric to third-rail operation, the engineman follows essentially the reverse of the above procedure.

Included in the locomotive auxiliaries are a radiator and resistor cooling fan motor, two traction motor blower motors, a pressurizing fan motor, and an air compressor motor. With the exception of the pressurizing fan motor, these must all operate from both diesel-electric and third-rail power. When operating from diesel-electric power, these motors are fed from the large d-c machine attached to the alternator which acts as a 600-volt generator with constant field. Thus this machine does double duty, since it also acts as a driving motor for the alternator when running from third-rail power. This unusual arrangement of the auxiliaries has a two-fold advantage. First, it places useful load on this machine at all times. Second, it assures that the commutator is carrying current during diesel-electric operation. This is most desirable for the purpose of reducing friction between the brushes and the commutator.

Train Power Supply

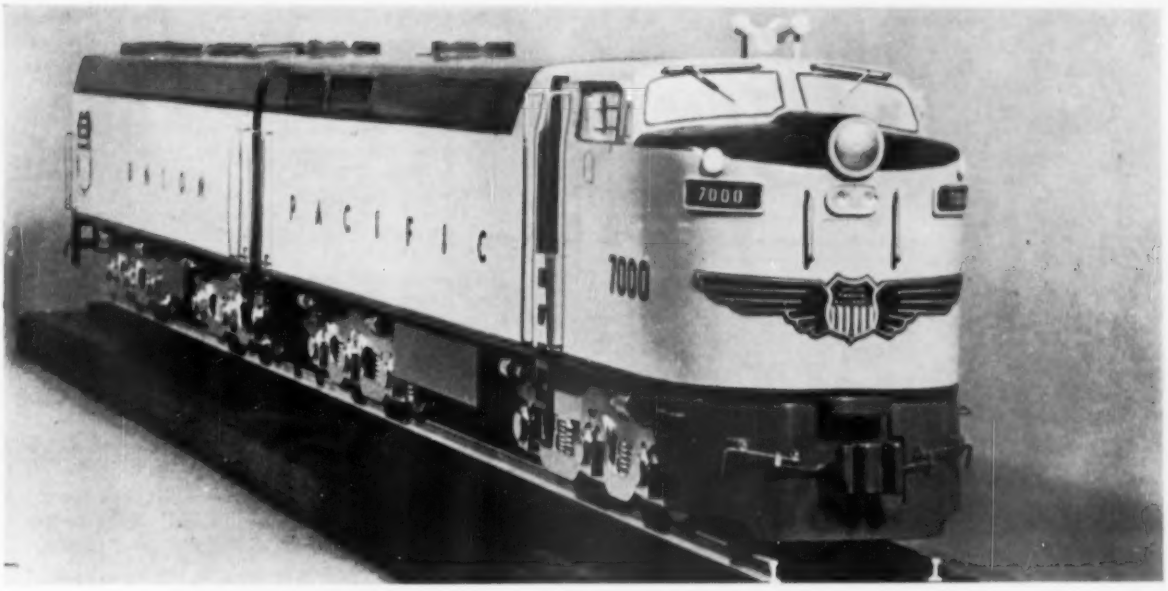
Train auxiliaries, such as fluorescent and incandescent lighting, heating, air conditioning, ventilating motors, etc., are designed for operation at nominal 440 volts, 3-phase 60 cycles. This power is readily possible on third-rail power by using a motor running at 720, 900 or 1,200 rpm. When diesel-driven, however, the alternator has to run at 850 rpm, with a corresponding frequency of 56.7 cycles. To operate inductive devices rated at 60 cycles on this reduced frequency, but on rated voltage, would result in higher than normal current consumption and possible shortening of life because of overheating. To prevent this, the nominal voltage of the a-c system was dropped in proportion to the frequency,—from 440 to 415 volts,—for both third-rail and diesel-electric operation.

Furthermore, the system is so laid out that the alternator operates with fixed field. This means that, for any given load, voltage and frequency vary together as the alternator speed varies within limits when operating on third-rail power. The result is essentially constant current in the fluorescent lamp circuits and near rated current values in the motors. Although the speed of all induction motors is about 5.5 per cent below normal, this is of no great significance since, in general, this slight reduction in speed can be compensated by suitable pulley ratios, fan design, or application margin.

When operating on diesel-electric power, the free-wheeling clutch is engaged and the diesel engine is driving the traction generator, the 600-volt generator for locomotive auxiliaries, the alternator for car power, and also the amplidyne exciter and auxiliary generator.

Train Line Circuits

Since train-line power is supplied from both locomotives, provision is made to prevent connections that would parallel the two alternators. This is done by installing a train-line switch in each car. The switch in each car that opens the power lines between couplers has a set of auxiliary contacts used to control the contactors in the locomotives. The operating coil of the locomotive contactor is energized through a control train line and a normally closed auxiliary contact on one of the car switches. This means that a car switch must be open before the contactor can be closed.



A model of one of the locomotives, the first of which will be delivered in 18 months. Scheduled for freight service, they will have a top speed of 65 mph and will weigh 408 tons on 12 axles.

8,500-Hp Turbine Locomotives for the UP

Simplified mechanical and electrical equipment will be housed in two sections to which a fuel tender will be coupled

The Union Pacific has ordered 15 8,500-hp gas turbine-electric locomotives from the General Electric Company and has expressed intent of ordering two additional blocks of 15 locomotives each. Total cost of these 45 locomotives would be in excess of $38,000,000.

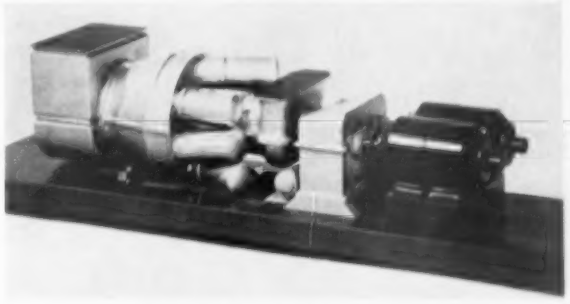
Currently the Union Pacific has a fleet of 25 gas turbine-electric locomotives in service, all built by General Electric, but of 4,500 hp.

The new locomotives will be built in two sections (permanently coupled together) with an engineman's cab at one end. A fuel tender will be coupled behind the locomotive. Geared for freight service, they will have a top speed of 65 mph and will weigh 408 tons on 12 axles. Overall length with the fuel tender will be 165 ft 8½ in., and height will be 16 ft 2 in. Over pulling faces, the locomotive is 119 ft 2¾ in. long, and wheel base is 108 ft.

Gas turbine-electric locomotives pack a large amount of power into a comparatively small space, require no water, have fewer moving parts than other types of similar horsepower, and use low cost treated bunker C oil as fuel.

The fuel tenders for the locomotives are being built by the Union Pacific. They are used to keep the weight of the locomotive on the driving wheel constant instead of varying as the fuel is consumed. The fuel tenders will be 46 ft 5½ in. long.

The locomotives will be built at the Erie, Pa., works of General Electric, and they are scheduled for delivery at a rate of two a month beginning in 18 months.

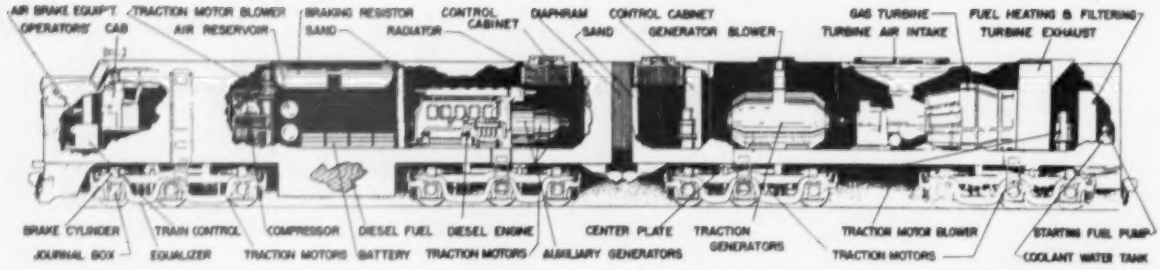


The power plant will consist of the turbine (left), connected through reduction gears to electric generators (right) which supply power to the driving motors on the axles.

The front section of the locomotive houses the auxiliary diesel engine (used for hostling and switching) and most of the auxiliary equipment. The rear section houses the gas turbine power plant and associated equipment.

For starting, a diesel-driven auxiliary generator set furnishes power to a main generator which cranks the turbine. After the generator gets the turbine up to a certain speed, diesel fuel oil is fed into the burners. When all burners are firing properly and are up to temperature, preheated treated bunker C oil is fed into the burners and the diesel fuel cuts out.

Air is taken in near the roof and compressed, mixed



Cut-away of 8,500-hp gas turbine-electric locomotive to be built for the Union Pacific by General Electric. The two units are coupled permanently, the front unit housing the accessory equipment, the back unit the main turbine powerplant and generators. During operation an insulated 24,000 gal. fuel tender will be coupled behind the locomotive.

with fuel, ignited, and burned in the gas turbine power plant. The turbine is connected through reduction gears to electric generators which supply power to the driving motors on the axles.

Design Improvements

Improved accessibility, easier maintenance, a simple traction motor ventilating system and improved arrangement for traction motor cables are expected in the new units because they employ a simplified running gear having four 3-axle trucks. In addition, two extra feet of height will be available for the apparatus cab.

Reliability will be increased and maintenance reduced by the elimination of the steam generator. Also, the main water tank, booster pump, condensate receiver tank, flash tank, blow down tank, train lines, and orifices will no longer be required.

As compared to a diesel, the UP expects increased reliability and decreased maintenance to result from a simplified control and mechanical system which has fewer pieces of mechanical apparatus, fewer electric machines, and less control devices and contacts than a 7,000-hp, 4-unit diesel-electric.

As compared to earlier turbine locomotives, reduced turbine idle speed with improved idling fuel rate will be obtained through the use of a heavy-duty, locomotive-type diesel engine which handles all auxiliary load, thus eliminating two auxiliary alternators driven by the turbine and much switching control equipment.

Generator insulation life should be increased and the possibility of flashovers greatly reduced by positive ventilation of the sealed main generator compartment with clean, dry air.

Greatly improved accessibility and consequent decrease in maintenance labor will be gained by eliminating some apparatus, improving the arrangement of other equipment and providing additional equipment space.

Treated bunker C fuel oil will be supplied from the tender, which has a capacity of 24,000 gal. The fuel is heated before it is placed aboard the tender, which is insulated with glass wool to retain the heat for long periods of time.

A new combustion chamber for the gas turbine is expected to provide longer life and lower maintenance cost. The chambers have increased length and have been designed to be as accessible as possible for lower maintenance cost. In addition, the cross fire tubes will be easily removable.

The fly-ball type mechanical governor used successfully in thousands of steam turbines will be employed to provide simplicity of operation, long life, reliability, easy adjustment, and low maintenance cost.

Simplified maintenance and high reliability are expected from the use of a gear pump and flow divider fuel system. Highly reliable, economical operation, together with improved fuel combustion, should result from the improved combustion chamber and fuel nozzle design.

All of these advancements are designed to permit the new locomotive to operate reliably at low cost.

Comparing the new gas turbine-electric locomotive, producing 8,500 hp, with 7,500 hp diesel-electric units, it is estimated that the turbine will have approximately 25 per cent less mechanical repair cost. It is further estimated that the turbine locomotive will show economies in electrical, mechanical and power plant repairs. In fuel consumption the diesel-electric will show an advantage, but, based on horsepower and fuel prices, the cost is expected to be about equal. Even on lubricants and wages, the new gas turbine-electric is expected to show advantages over comparable diesel-electric units.

A comparison based on thousand gross-ton-miles per train-hour shows the new gas turbine holding an advantage over the diesel-electric, according to General Electric spokesmen. The new turbine-electric is designed for more gross ton-miles per freight train-hour at lower operating cost.

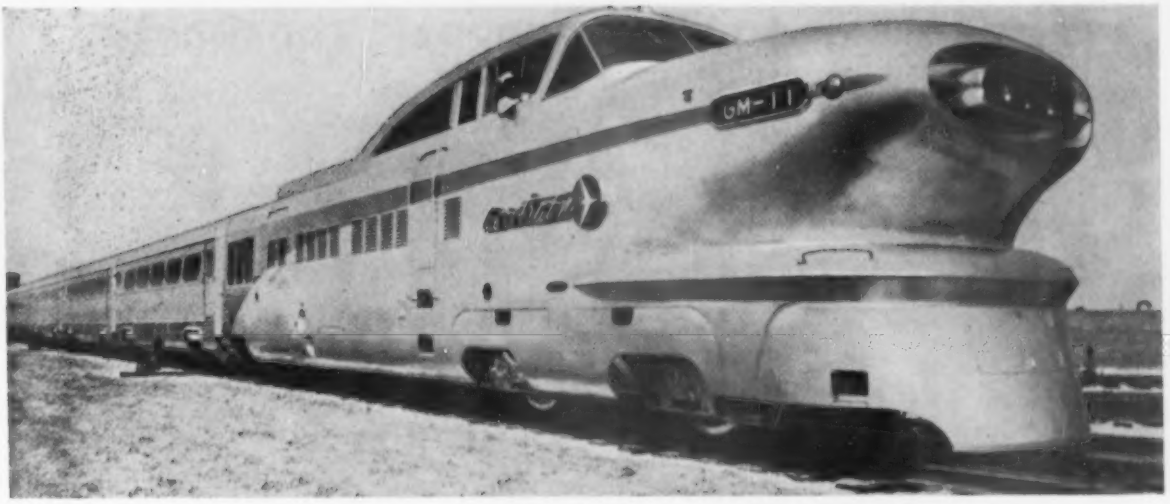
Mechanical Features

The two cabs will be road box type cabs. At front and rear the locomotive is equipped with a Type F coupler and M380 rubber draft gear. The two cabs are joined together by Type F couplers but no draft gear. Uncoupling arrangement for these couplers will be locked to prevent accidental separation of the two cabs.

The leading unit contains operator's cab, control, and auxiliary power unit necessary to operate the locomotive. The trailing cab contains the main power plant which is remotely operated by controls and auxiliary systems located in the leading cab.

The gas turbine is rated 10,700 hp at 1,000 ft elevation and 80 deg F. At the ambient conditions of 6,000 ft elevation and 90 deg F, the power plant will produce 8,500 hp input to the generator for traction which corresponds to 7,000 hp at the rail.

Air brakes will be Schedule 24 RL, single-end equipment, including safety control features. Main reservoir capacity is 160,000 cu in. The two air compressors have three cylinders and two stages. They are intercooled and are rated 202 cfm, 140 psig, at 900 rpm. They are electric motor-driven.



Styling of the Aerotrain locomotive is a radical departure from the Electro-Motive standard. Design includes only one power truck. The rear of the locomotive is carried by a two-wheel idler truck.

Electro-Motive's Latest . . .

Power for Lightweight Trains

Passenger locomotive designed for high-speed low-slung unit trains.

The locomotive powering General Motors Aerotrains and the Rock Island "Jet Rocket" is a model which has been developed as a part of the complete "Aerotrain" design. It is a 1,200-hp unit with a maximum speed of 102 mph and a center of gravity lower than the standard diesel locomotives previously produced by Electro-Motive. This locomotive has an overall height of only 13-ft 7-in. and a length of 53-ft.

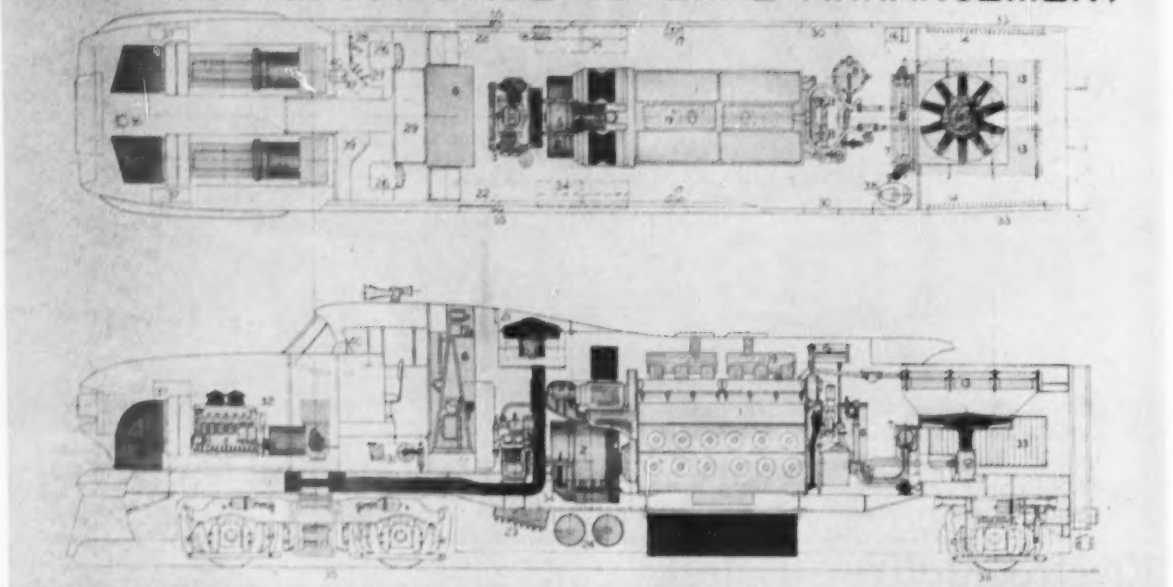
The locomotive has been developed as an integral part of the complete train designed by General Motors at the request of a number of railroad presidents to satisfy the following overall objectives:

- Reduce equipment investment
- Reduce maintenance and operating costs
- Lower center of gravity and increase average speed.
- Improve riding comfort
- Make possible lower fares to attract greater passenger traffic. Locomotive design would be primarily concerned with the first three of these objectives and EMD's experiences with the power plants and structures of many gasoline-electric rail cars and over 16,000 diesel locomotives were brought into play. In this design, standard components already in mass production were used whenever possible because they would lower first costs and could be expected to provide the greatest reliability and dependability.

In making the design, the weight of the complete train including the locomotive was to be about 600,000 pounds and styling was to dramatize the train and heighten public interest in it. In the past, diesel locomotives have been designed to provide the best possible compromise in order to meet the wide variations in existing passenger equipment—variations in weight, heating, lighting and air conditioning. Here EMD designed a train and matched it with a prime mover to obtain what they claim to be the ultimate in utilization and economy. The diesel propulsion engine, auxiliary diesel engines and the size and weight of the cars were determined by the contribution each makes to the most successful whole from a standpoint of performance, first cost, operating cost, maintenance, repair costs and safety. The design of a locomotive which would never have to operate with present-day standard passenger equipment allowed for the elimination of head-end steam heating with the problem of long steam line and adequate water supply. The auxiliary power on the locomotive supplies current not only for train lighting, but for individual heating and air conditioning units in each car. The elimination of steam lines has made possible the use of automatic couplers that also make the electrical and air connections as the cars come together. With no interchange problems, a completely new brake system has been designed to reduce both costs and weight.

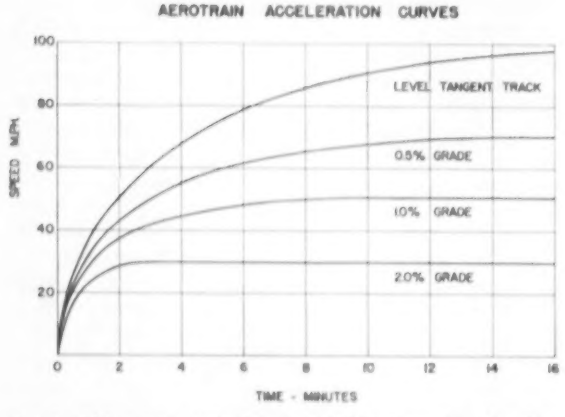
Since total weight of the complete train was to be approximately 600,000 lb, design of the "Aerotrain" locomotive started by determining the minimum horsepower needed to pull this weight at a maximum speed of 102 mph. The 1,200-hp 12-567C diesel engine was found adequate to meet the performance requirements of the train.

AEROTRAIN LOCOMOTIVE GENERAL ARRANGEMENT



1 ENGINE - EMD MODEL 12-567C
2 GENERATOR - EMD MODEL D15E
3 AIR COMPRESSOR
4 TRACTION MOTOR BLOWER
5 AUX. GENERATOR
6 ELECTRICAL CONTROL CABINET
7 LUBE OIL COOLER
8 LUBE OIL FILTER
9 FUEL FILTER
10 FUEL PUMP
11 COOLING FAN
12 FAN DRIVE GEAR BOX
13 RADIATORS
14 SHUTTERS
15 WATER TANK
16 LOAD REGULATOR
17 FUEL TANK VENT
18 HAND BRAKE
19 EXHAUST MANIFOLD
20 AIR FILTER
54 AUX. ENGINE AIR DUCT
21 DYNAMIC BRAKE
22 BODY SIDE DOOR
23 COMPRESSOR AFTER COOLER
24 MAIN AIR RESERVOIR
25 FUEL TANK
26 CAB SEAT
27 CONTROLLER
28 BRAKE VALVE
29 TRAP DOOR
30 MAINTAINENCE DOORS
55 FIRE EXTINGUISHERS
31 AIR BRAKE EQUIPMENT
32 GENERATING SET - MODEL 6-71
33 ENGINE COOLING AIR INTAKE
34 BATTERIES
35 POWER TRUCK
36 IDLER TRUCK
37 SAND BOXES
38 HOPPER
39 CAB HEATER
40 SPEED INDICATOR

Equipment installed in this 1,200-hp passenger unit includes dynamic braking and the two diesel alternators in the nose which light, heat and air condition the entire train. There is no steam generator.



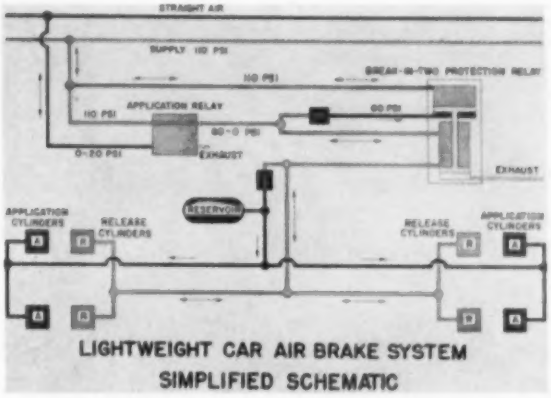
Speeds which can be attained by the 1,200-hp locomotive when handling the 600,000-lb Aerotrain vary from 30 mph on a 2 per cent grade to over 100 mph on level track.

Transmission of this power could be done through two D-37 traction motors. This then led to the design which uses a two-axle power truck under the front of the unit and a single idler axle at the rear which does contribute to the overall weight reduction.

The underframe consists of two fishbelly I-beam center sills which serve as main carrying members for the carbody, cab and equipment. Two side sills, supported by the center sills, partially support the cab and carbody framing and skirt arrangements. The outside finish of the locomotive is light-gage sheet steel welded over the structural framework, and the radical styling blends with the Aerotrain cars. Coupler pockets are welded to built-up platform constructions between the center sills. Jacking pads are provided for lifting the locomotive. The complete underframe is of all-welded construction.

Main propulsion equipment consists of the 12-567C engine, a standard EMD D-15E direct current generator and the two traction motors. Engine and generator are located in the depressed fishbelly section of the underframe to lower the center of gravity. Cooling equipment is located at the rear of the locomotive. Major components between the engine-generator and the control cab are the air compressor, dynamic brake hatch, and the electrical control cabinet. The air brake equipment is located under the cab floor.

In the nose of the locomotive are mounted two auxiliary power units. They supply electric power for lighting, heating and air conditioning of the train. These are standard units—six-cylinder Model 6-71 Detroit diesel engines powering 440-volt, 3-phase, 60-cycle a-c generators. In addition to transmission of this power through the length of the train, the automatic couplers also contain the connections for three pneumatic circuits. The locomotive supplies air at 110 psi through the train to power the brake equipment and to maintain pressure in the "air-ride"



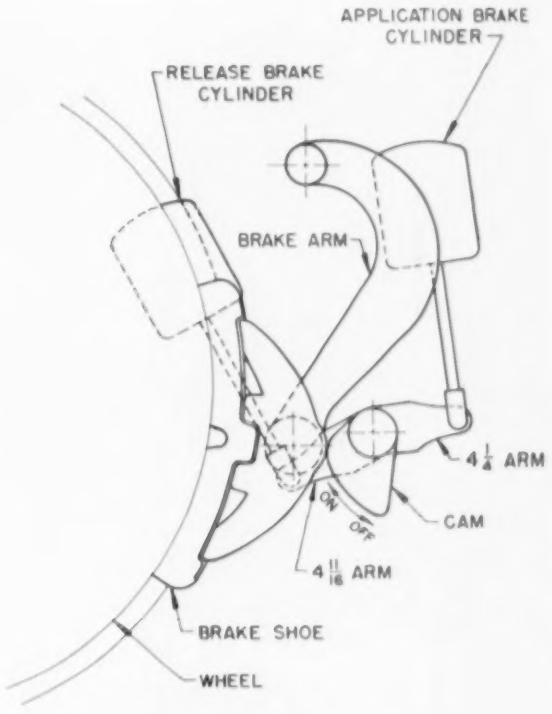
LIGHTWEIGHT CAR AIR BRAKE SYSTEM
SIMPLIFIED SCHEMATIC

How Does "Aerotrain" Brake Work?

Essentially a straight air brake system, braking power is applied to the wheels through plastic brake shoe. Because of the higher friction valves obtainable, only one third the force necessary with cast iron brake shoes is necessary. This made possible the use of much smaller brake cylinders.

There are two principal circuits in the system which are trainlined through all the cars—the straight air line and the supply line. There is also a conventional signal line. Air is supplied to the cars at 110 psi through the supply line to the application relay and break-in-two protection relay. The straight air line controls the application relay on each car. The application relay regulates the maximum air pressure supplied to the release and application cylinders and the volume reservoir. This pressure is predetermined, depending upon the retarding rate desired and is nominally 60 psi.

The release and application cylinders are of the same area and mounted so as to oppose each other in operating the brake linkage. The force of the release cylinder is applied through a slightly longer lever arm than that of the application cylinder, so that when the pressures in each are equal, the brakes are released. Operation of the control handle in the locomotive allows air pressure to develop in the straight air line. This reduces the regulated air pressure which the relay valve supplies to the release cylinders at the rate of 3 psi reduction for every 1 psi increase in the straight air pressure. Pressure in the application cylinders and volume



BRAKE RIGGING ON LIGHTWEIGHT CAR

reservoir remains the same because of a check valve in the line. Thus, the brakes are applied with a force proportional to the pressure differential between the release and application cylinders which is dependent upon the reduction made. In the case of full application, a valve in the locomotive drops the pressure in the supply line to zero, which operates the break-in-two features of the locomotive and each car.

The time required for application or release has been kept to a minimum on the Aerotrain by the arrangement of equipment and small volume of the brake cylinders. A full application is in effect 3.75 sec after movement of the brake valve handle. A service application of 45 psi is in effect within 5 sec on the tenth car of the train.

springs that are used on the coaches. There is a straight air line for control of the brakes. A signal line not only serves as a communicating system, but also provides initial pressure in the "air-ride" suspension, and provides a warning in the cab in event of its failure.

The brake system is essentially a straight-air brake with variations that permit the operation of two to twelve cars in multiple service. GM chose this to reduce weight and costs. Break-in-two protection is provided in event of a train parting. It also would be possible for a standard locomotive to haul the "Aerotrain" in an emergency and maintain adequate air brake control. The system is said to feature simplicity with rapid and accurate response.

On the locomotive, the electrical transition control relay is modified so that it tends to keep the power higher during very rapid acceleration, and more effectively loads the power plant in areas of moderate to high-speed operation at reduced throttle. Motor cutout control has been improved so that, with one traction motor cut out, practically full power capacity of the other motor can be utilized over a relatively wide speed range.

The Rock Island will be the first road to place one of these locomotives in regular service. It will pull the ACF-Talgo "Jet Rocket" between Chicago and Peoria. The New York Central is expected to be the first to use it to haul a GM "Aerotrain" in passenger service. This train is to be on the Chicago-Detroit run in 1956. The complete Aerotrain is to be tested on a number of railroads before regular service begins. While this locomotive is the basic design of a unit EMD plans as a standard one for lightweight trains, present models are experimental. Modifications indicated as necessary by a year's testing now getting under way will be incorporated before details of the design can be considered final.

WESTERN PACIFIC MECHANICAL DEPARTMENT — PART I

How WP Is Reducing Equipment Maintenance Costs

Early dieselization, modern cars and scheduled car maintenance all play their parts

The Western Pacific was able, in the first eight months of 1955 to effect a 33% increase in net through a constructive epuipment policy designed to assure reliable performance at minimum expense.

Locomotive repairs decreased 2.7 per cent, freight train car repairs 2.6 per cent and total direct equipment maintenance expense 1.8 in the first eight months of 1955 compared with the same period in 1954. The ratio or maintenance of equipment expense (including) depreciation to total operating revenue also decreased 9.45 per cent in this period.

The WP has several "firsts" to its credit. It was among the first to use diesel freight power (16 years ago) on the west coast and has kept accurate figures on unit cost, availability and other major factors ever since. It now operates a total of 168 units aggregating 226,080 hp.; has been completely dieselized for the last three years, during which time no steam power has been operated, and the six remaining steam locomotives will be disposed of as soon as their flue dates expire.

This railroad has never used "riders" on diesel locomotives and was the first to use modern detergents in lubricating oil to secure improved performance and reduce maintenance. It was among the first to utilize modern methods in training officers and supervisors, also improving supervisor-employee relations and working conditions in all departments including mechanical.

A good example of the last mentioned program occurred early in 1951 when the Western Pacific initiated a job-methods plan which involves monthly committee meetings at all major shop and terminal points designed to promote safety, improve working conditions, increase efficiency and maintain closer relations between supervision and maintenance forces. A fixed, fast-moving order of business is specified for these committee meetings at which all members have equal standing under

the chairman, regardless of position held on the railroad.

A special effort is made to develop and act on specific suggestions for improvement and, since this plan was inaugurated on the railroad four years ago, in the mechanical department alone a total of 310 proposed changes in practice have been discussed and considered from every angle; 192 being accepted, 99 rejected, 4 withdrawn and 15 pending, as of October 15, 1955. For all departments on the railroad, the record shows 681 proposals, 469 approved and in effect.

Diesel Maintenance

The system of maintenance used on the WP is somewhat different in being tailored to fit operational requirements and not set up in general on an arbitrary interval. Inspection governs in all cases except in the overhaul of traction motors. Once a month each diesel engine is given a close inspection to determine wear and necessary adjustments are made. Actually, except for a few variations, a system of progressive maintenance is used.

The Oroville diesel shop was converted from an 18-stall steam enginehouse without extensive improvement. Plans are in progress for the erection of a modern three-stall (each stall to handle four units) diesel shop which will be fireproof and designed to promote fullest efficiency, with overhead cranes and mechanized equipment, so a minimum of labor will be necessary. With present facilities, no overhead cranes are available for removing engines and generators which must be done at Sacramento shops. This will not be necessary with erection of the new facility.

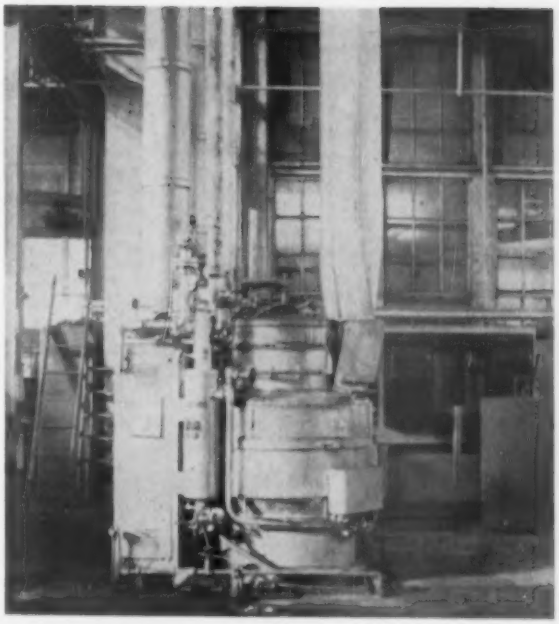
A system of training mechanics, now in effect, consists first of giving supervisors a thorough course in the best diesel maintenance. Leadmen of both the electrical and machinist crafts assist in training diesel mechanics. After a force has been established, through agreement with the local chairman, the men are changed from one job to another so they become familiar with all phases of maintenance.

When new men are added to the force, they are placed with a certain gang for two or three weeks, and then rotated from one gang to another to acquire a thorough knowledge of the work. In this way, the WP avoids having specialists who do only certain types of maintenance work. Any mechanic in the force is capable of performing any phase of maintenance work required on any shift. The supervisors personally check all important repair work vital to the operation of either electrical or mechanical parts.

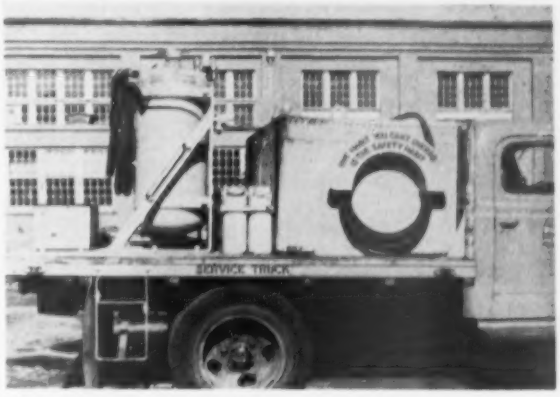
The success of this system is indicated by the fact that in 15 years of operation the WP has lost only two crankshafts on account of faulty maintenance, and failures and delays average about four per month on the 168 units operated.

A Forward-Looking Car Program

During the last five years the WP has purchased 2,282 new cars which include mill-type gondolas and flats including piggyback and bulkhead cars equipped with roller bearings, box cars with special devices such as auto loaders, damage-free, compartmentized and insulated cars, along with standard type steel gondolas. The addition of these new cars has assisted in reducing the bad order percentage from 3.6 to 1.2, as 40 per cent



A battery of Vapor automatic steam generators installed at Sacramento shops replace the old-type boiler and avoid the necessity of having stationary engineers around the clock.

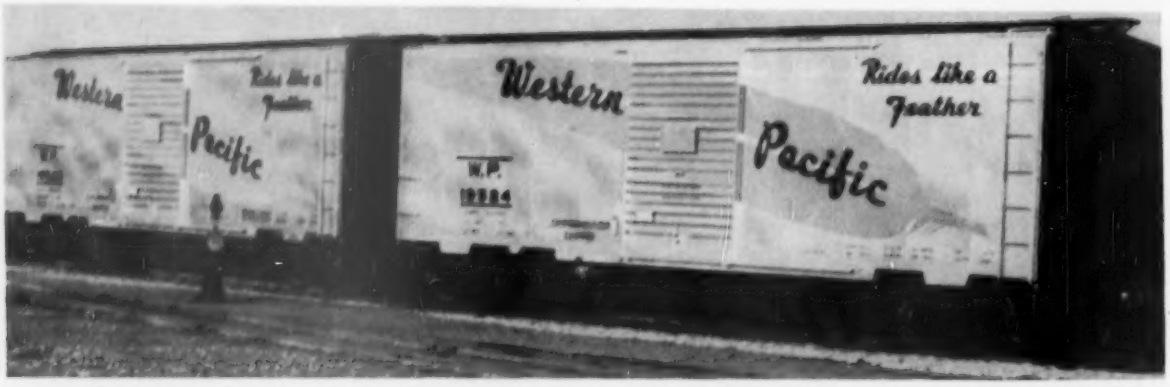


Mobile service truck which handles sand, diesel fuel, lubricant, etc., saves sending switchers to the enginehouse for service.

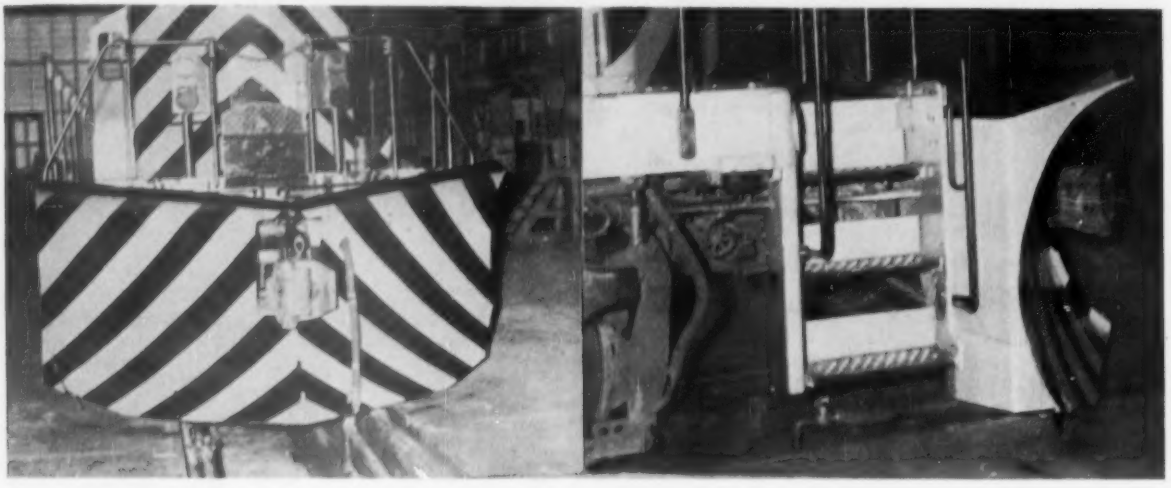
of all freight equipment is practically new. This has enabled the railroad to establish a retirement and dismantling program in order to dispose of all obsolete and worn out freight equipment for which there is little or no demand. This has also made possible large reductions in current maintenance costs for car repairs, and made available to shippers the latest improved type freight cars for their use. There remains only 493 cars to complete the retirement and scrapping program.

All heavy car repair work is performed at Sacramento shops, which can turn out an average of 100 cars a month and more, if necessary. All material is palletized and handled by mechanized equipment, such as lift trucks, crane cars, towing tractors and industrial shop trucks. These devices not only save time but decrease labor costs for operations involved in their use.

Assembly line methods are used for progressing cars through the shop and each gang completes its work be-



Large purchases of new cars such as these compartmentizer type box cars have greatly reduced the average age of Western Pacific freight car fleet. Road is planning to put this equipment on scheduled maintenance.



Snow plow installed on the road switcher finds use along much of the Western Pacific line.

fore cars move to the next work station, so one operation does not interfere with the other.

Studies are constantly being made to discover changes necessary to expedite the repair work. For example, Nulock type lining is used to advantage where complete relining is necessary. Nulock consists of short lengths of lumber which have been glued together to form lining material and comes in widths of 14 in., requiring only half as many nails as conventional size lining. This reduces the time and labor necessary to reline a car.

A circular resaw has been installed to handle odd-size lumber requirements and for salvage purposes. It is found through the use of the resaw a considerable amount of lumber is salvaged for other uses, which otherwise would have to be discarded. The WP resaw plant paid for itself in a short time.

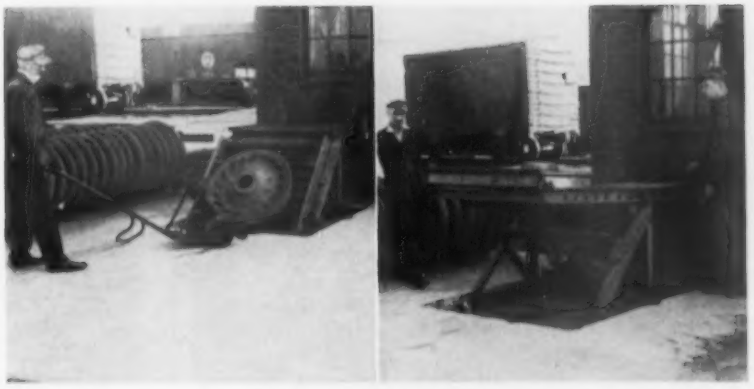
A schedule for the general repair of freight equipment on a five-year interval is being studied which contemplates the shopping of all cars after that length of service. This eliminates the punitive deterioration occurring on freight equipment through rust and excessive wear, and tends to keep equipment in good condition with the majority of the cars available in the highest classification bracket. In addition, the unit cost of repairing the cars is decreased as much as 50 per cent on the WP since repairs can be made before punitive deterioration has a chance to cause further damage. This is a practice which largely eliminates Class D cars not suitable for high-class lading.

The bad-order situation as of October 31, 1955, shows 1 per cent of the entire ownership as bad order which is the equipment now in shop undergoing repairs. Actually this amounts to a controlled bad-order list as cars are bad ordered and placed on shop tracks so there is no backlog of cars awaiting repairs.

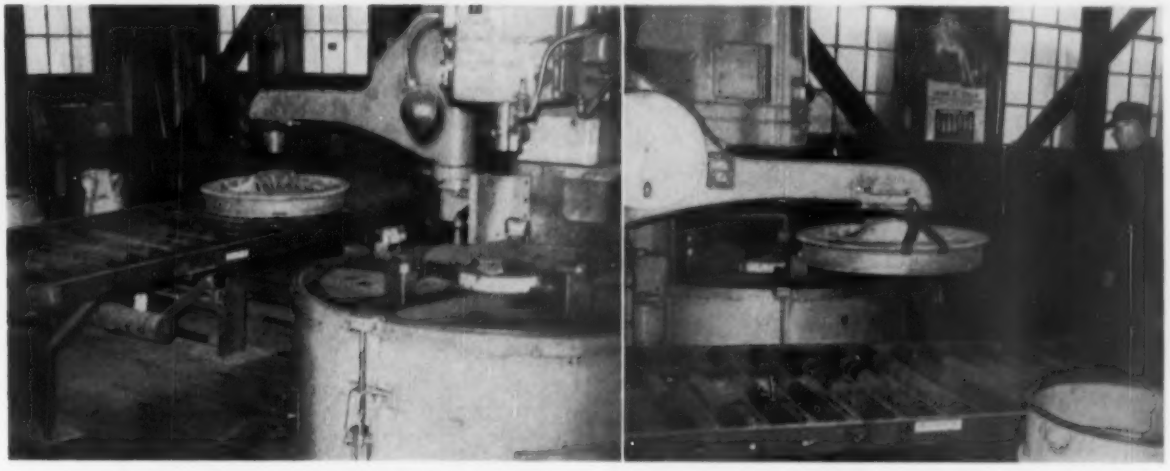
In the matter of conditioning journal boxes, it is felt if the journal boxes were conditioned properly at the originating terminal, cars should run at least 1,000 miles before further attention is necessary. This theory has been tried out on the WP and found practicable. At Stockton, Cal., journal boxes are conditioned on cars to operate through to Salt Lake City, Utah. At intermediate terminals, only a running inspection and a check of the journal boxes by hand has been found necessary. This handling has saved as much as an hour's time at the terminal between Stockton and Salt Lake City, a distance of 841 miles, over which distance trains run through four terminals. The number of hot journal boxes recorded on the WP is less than the national average.

Pittsburgh & West Virginia Shows . . .

How To Mechanize Car Wheel Handling



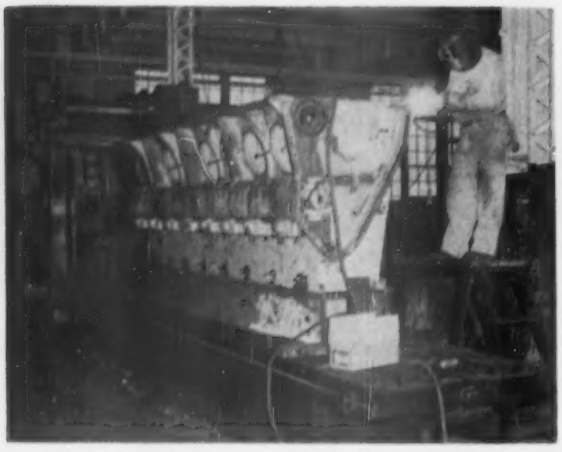
Hand truck is used to move a wheel from outside storage at the Rook, Pa., wheel shop to the end of the conveyor line where trunnion type air cylinder elevates hinged conveyor section so that the wheel then travels into the wheel shop . . .

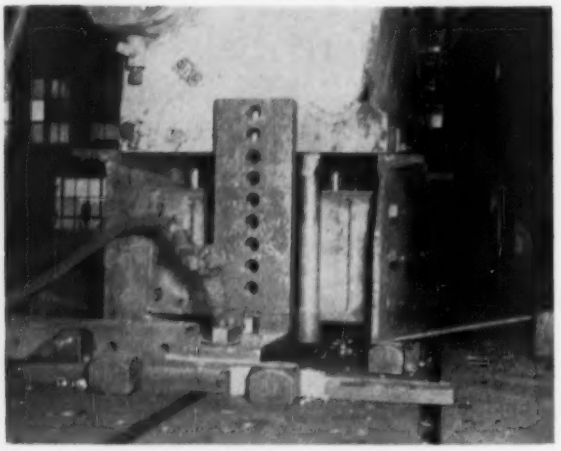


Through a small door and is halted with a foot operated "brake" in position for the boring mill hoist to move the wheel to the machine for boring. After machining, the wheel goes back to the conveyor. Wheel work for approximately 2,000 freight-cars owned by this 132-mile railroad is done in this well equipped shop.

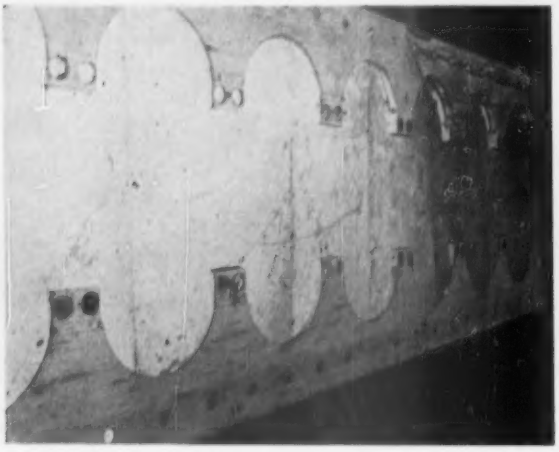
Because the wheel is not raised off the conveyor rolls when the foot pedal of the counterbalanced "brake" is not depressed the wheel continues its trip along the conveyor line and comes to the end adjacent to the single-end wheel press where it is raised to a vertical position ready for insertion of axle prior to mounting.

Ideas for the Diesel Repair Man...

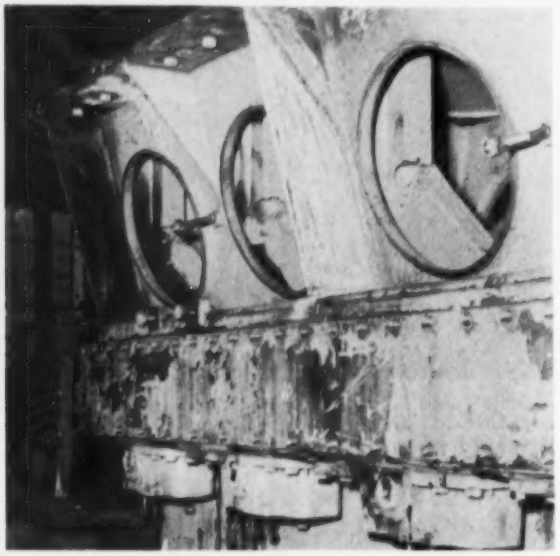




First step in realignment is to weld up cracks developed in service with the engine mounted upside down on a pair of channels (right) 14 in. deep to clear the studs and accurately machined



A piece of form-fitting plywood is used when planing to keep weld splatter and other foreign material from dropping in the openings



Three additional webs are welded on each side of the engine to increase stiffness and to strengthen against future cracks

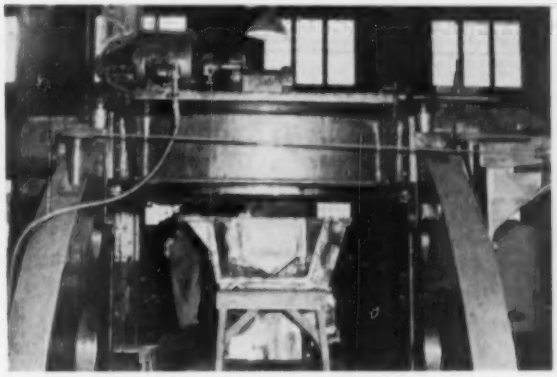
REALIGNING BALDWIN ENGINE FRAMES— One road has found a solution to the problem of distortion on Baldwin engine frames after welding cracks that developed in service. Originally, shimming between the crankcase and the engine block was employed as a temporary repair until the locomotive was due in the shop for a major overhaul.

When the unit comes into the shop and the engine is removed, all welds are gone over again, and then peened to stress-relieve. The case is placd upside down on a horizontal planer and 0.010 in. planed off the bottom of the cylinder block.

This surface is planed because it is critical for alignment of the crankshaft bearings which are supported entirely by the base. Unless the cylinder block is true on its lower surface, it will distort the base and main bearing alignment, resulting in crankshaft distortion. The amount to be taken off (.010 in.) was determined by the thickness of a gasket applied between the block and the sump several steps later in the procedure. This gasket is .017 in. thick, but compresses down to .010 in.

One purpose in installing the gasket is to eliminate excessive planing and welding. By providing the equivalent of .010 in. of metal, the gasket permits planing of the same amount from the engine base. This depth of cut is sufficient to take care of most of the warpage of the bottom surface. *Another purpose of the gasket is to prevent oil leakage.*

There will remain certain areas that will be found to be warped to the extent that the surfaces will be below



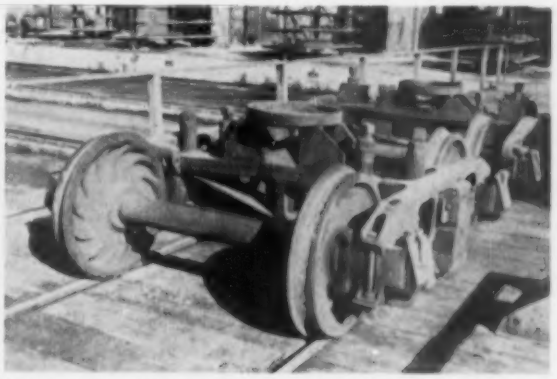
200 man-hours doing the job were saved by modifying the planer to accommodate the engine on the raised channels.

the newly planed surface. These are built up either by metallizing or by arc welding. In welding, skipping around is practiced to avoid heating up an area too much and causing distortion. When the newly welded areas are planed down to the surface on which the .010-in. cut was taken and the gasket inserted, the original relationship of the cylinder block and engine base is maintained.

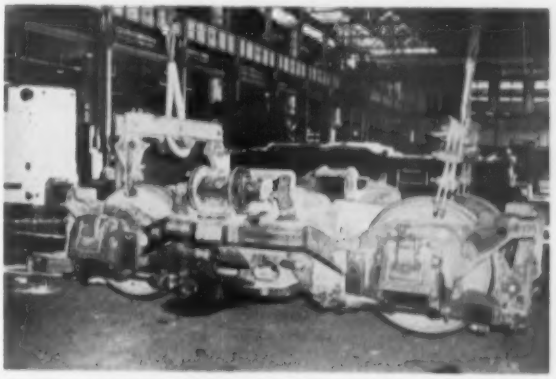
A horizontal planer, recently modernized, has greatly speeded up this job, saving approximately 200 man-hours over the former procedure. The principal modification was the addition of two parallel strips machined from 14-in. channels to the planer bed. These permit the block to be set upside down on the bed without removing the studs. The removal and reapplication of the 30 or 40 studs, depending on whether the engine had six or eight cylinders, was not only time consuming but resulted in about a fifth of the studs being damaged and not able to be reapplied.

When the 14-in. channels were applied to permit the studs to clear the planer bed, the height of the engine on the channels became too much to clear the cross-rail. This was raised by bolting it to different holes in the uprights, while the feed screw on each side was raised by putting a bushing underneath.

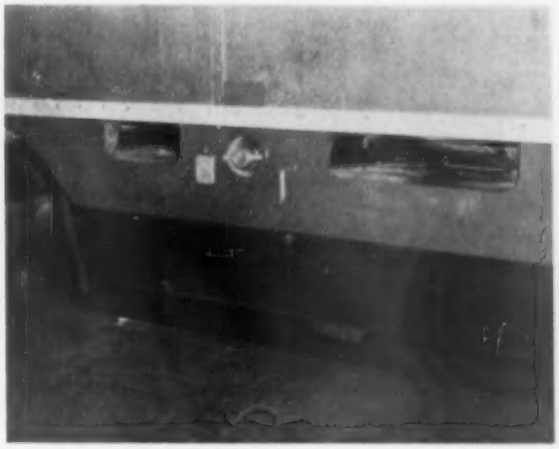
Lifting lugs avoid sharp kinks in wire rope used for lifting units at the railroad's back shops. A second plate secures the lugs shown to the square-section jacking pad on GM switchers and completes the chamfer section in which the wire rope rides.



Center plates welded on some old freight car trucks permits locomotives under repair to be moved about easily.



Lifting solid-bearing diesel trucks by the wheels instead of the frame has been found helpful by one road in avoiding displacement of the brass and wedge.



Deepening the inspection slot from 4 in to 8 in has resulted in easier cleaning and inspection of the tops of fuel tanks.

HOW CONVERTING AUXILIARY TANKS SAVES

MONEY IN SERVICING DIESELS.—Converting an old steam locomotive tender into a mobile filling station carrying sand and fuel oil for diesel switchers has benefited the Illinois Central in two ways. The converted tender eliminates the need for installing diesel fuel and sanding stations at smaller points. It serves also as its own medium for carrying the sand and fuel between the outlying point where these are dispensed and the larger terminal at which the tender is supplied.

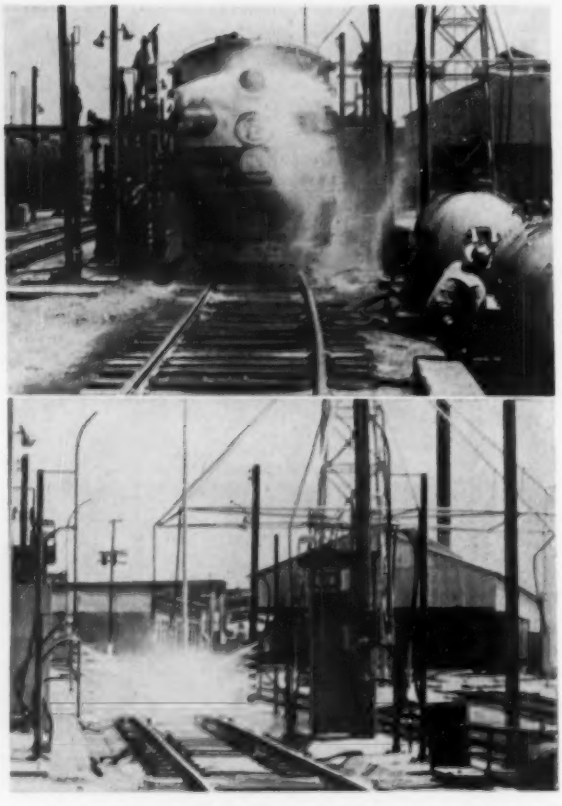
The first tender converted is in use at Dyersburg, Tenn., where it services the diesel switcher which operates there and on a local branch. This diesel uses about 2,000 gallons of fuel oil a month. This means that the mobile tank—which holds 10,000 gallons of fuel oil plus 130 cu ft of sand—can fuel the unit for about five months before it needs to return to Memphis, Tenn., to replenish the oil and sand.

Because of the way the sand pyramids when loaded, the sand tank has a volume of 200 cu ft to hold the approximately 130 cu ft of rated sand capacity. This is good for about 2½ months' operation. Two more tenders will have twice the sand capacity to avoid having to add sand at the local point.

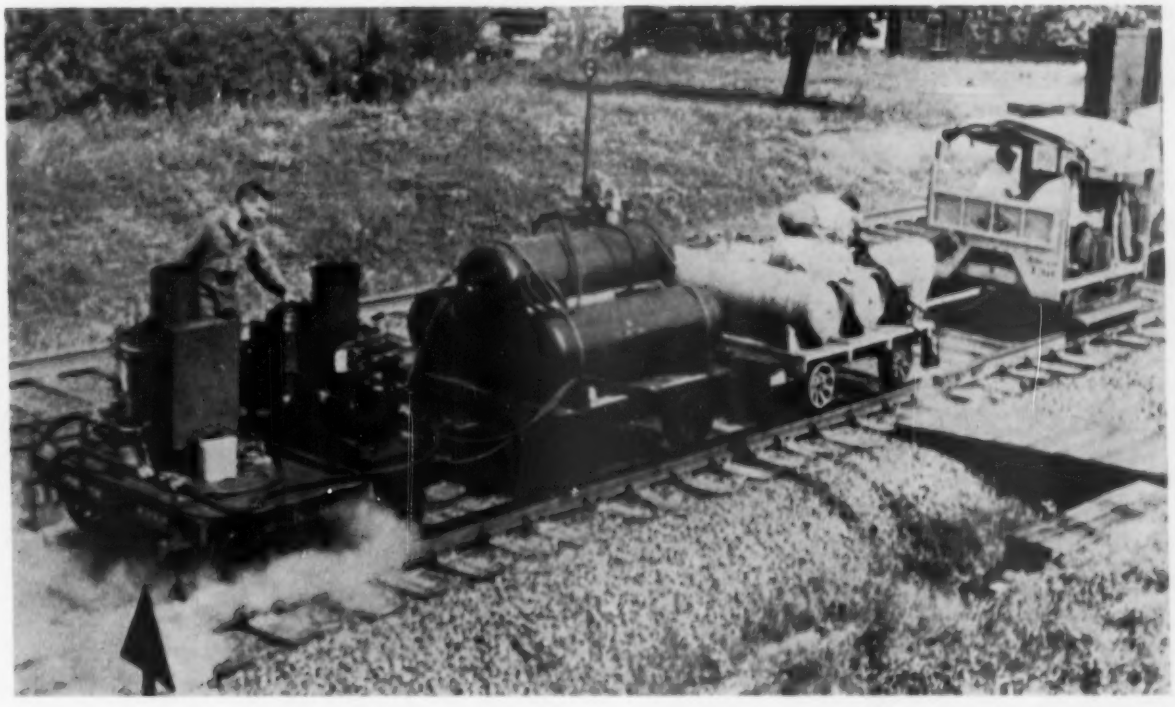
Fueling the switcher is done by placing the mobile tank on a siding near a permanently mounted electric pump. There were two reasons for putting the pump on a concrete base rather than on the tender: (1) in the event the tank was derailed in transit there would be no damage to the pump, and (2) an ordinary tank car could be substituted for the tender if necessary.

As far as the fueling operation is concerned, delivery is the same as from a fixed installation. One oil line is connected between the tank and the pump, another between the pump and the locomotive. The diesel's own air pressure transfers the sand from the mobile tank to it through a third hose.

Conversion of the tender was handled by the mechanical department forces at the Paducah shop. The rebuilt unit cost about $3,000.



Low-level hot water jets to clean the trucks have been added to its locomotive washer by a southwestern road. Water pressure at 125 psi gives good cleaning action but causes no moisture troubles in the traction motors. Water temperature is 80 to 85 deg F.



Equipment used in rail washing tests.

High Driver-Rail Adhesion . . . Without Sand

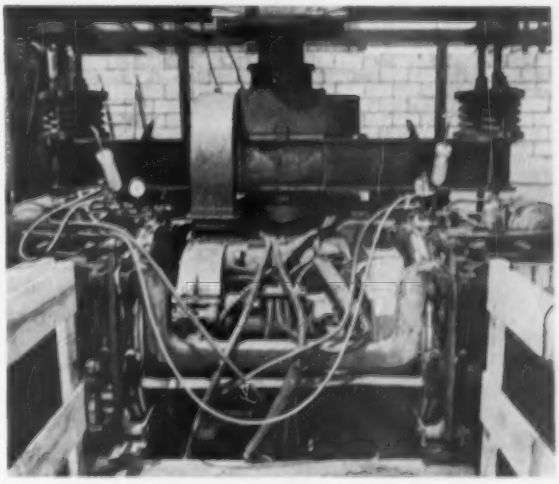
If high adhesion by use of chemicals proves practicable, it may become necessary to have traction motors with higher thermal capacity

SLIPPERY RAILS—usually made slippery by a combination of a little oil or grease and light moisture—can be made to have the adhesion of a dry rail by washing. An article on this subject appeared in the October 1954 issue of *Railway Locomotives and Cars*. Road tests made since that time have resulted in the development of means for washing rail and also the finding of chemicals which, when applied to locomotive drivers, or the rail, will permit a locomotive to operate at adhesions up to 26 per cent without sand.

A paper presented before the Annual Meeting of the American Society of Mechanical Engineers, Chicago, November 13-18, 1955, by Franklin G. Fisher, assistant mechanical engineer, Reading, and Robert K. Allen, General Electric Company, reports an investigation of the causes of low wheel-to-rail adhesion and possible methods of improving it.

Excerpts from the paper, dealing with the tests and new developments are included in the following.

Up to the present time limiting values of running ad-



Dynamometer test stand with equipment for evaluating rail conditioning materials.

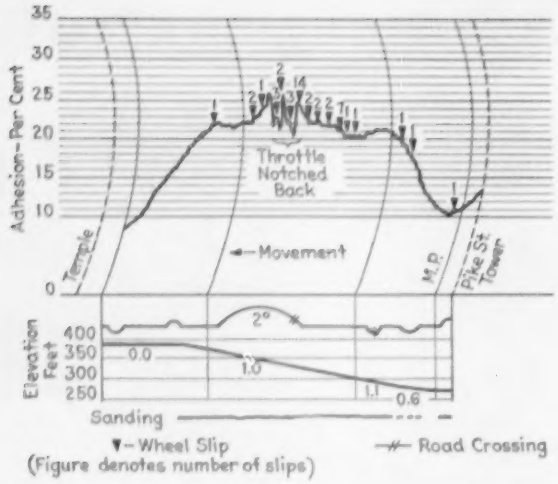


Chart No. 1. Adhesion chart of test on Temple Grade with untreated rail with two locomotive units—71 cars (58 loads, 13 empties) totaling 5,123 adjusted tons. Weather clear.

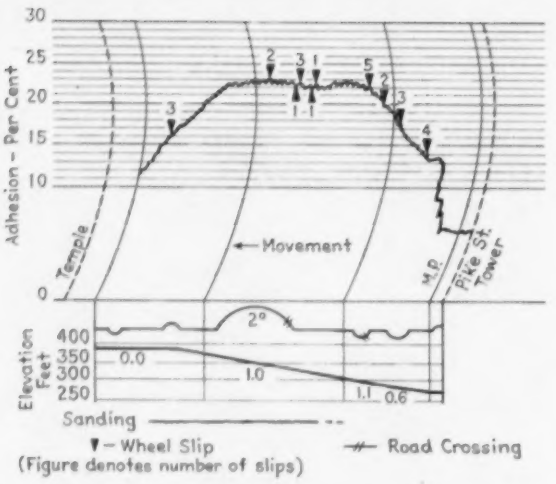


Chart No. 2. Adhesion chart of test on Temple Grade with washed rail made with 4 diesel units, and 122 cars (117 loads, 5 empties) totaling 10,379 adjusted tons. Tonnage rating for grade, 10,000 adjusted tons. Weather clear.

hesion have generally been accepted in railroad practice as follows: (a) 15 per cent of weight on drivers for greasy, moist rail; (b) 20 per cent for clean dry rail; and (c) 25 per cent for clean, dry rail well sanded. Although a starting adhesion limit of 30 per cent was tentatively set for locomotives with electric drive, its attainment required specially favorable conditions which could not be counted upon in day to day operation.

Stalling of trains as a result of wheel slip is costly. For example, in one case continuous stalling on a short grade with a trailing load of 8,000 tons necessitated reducing the load to 7,000 tons. This required an extra train every seventh day to handle the traffic. At $2.00 per mile, this represented an annual increase in cost of $20,800 for a 200-mile trip.

The cost of extra trains, however, is only part of the expense chargeable to wheel slippage. It is also a major cause of damaged traction equipment, burnt rails, flat wheels, costly train delays, parted trains, and poor ballast and rail condition resulting from excessive sanding. Moreover, to prevent stalling on limiting grades, it is often necessary either to provide extra crews for pusher service or to add one or more units to the locomotive—units that are needed for only a small fraction of the total run.

While the many and varied causes of locomotive wheel slip include items related to locomotive design, maintenance and operation; others related to maintenance of way; and still others involving train dispatching and physical layout of the line, the prime cause is the contamination of the rail surface.

Although there may be many methods of removing this thin oil film that causes slipping, all are not equally effective or practical. In the laboratory, abrasion or polishing proved good, but it is impractical for railroad use. Early tests with flame cleaning showed it to be too slow and costly. Chemical attack on the oil film seemed most promising. Two approaches were tried: rail cleaning and rail conditioning.

The first method consisted of cleaning the rail with detergents. Material used had to penetrate the film at a rate that would permit the residue to be washed off the rail in a few seconds. Many chemicals were tested, both in the laboratory and in actual service. Cleaners of the solvent type were found to be best. High alkali or acid type cleaners, because of incomplete penetration of deposits, tend to leave a residue that make the rail more slippery.

To successfully clean rail, the proper solution and correct rate of detergent application had to be determined, a source of adequate water and steam supply provided, equipment for spraying had to be assembled, and the question of whether to apply from the locomotive, the caboose, or a separate unit decided. Lack of steam supply on diesel-electric freight locomotives, as well as other considerations, pointed to the choice of a separate unit either self-propelled, or mounted in a specially designed railroad car.

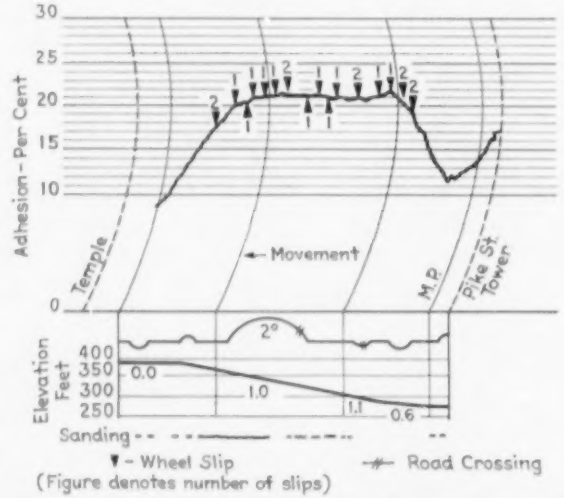


Chart No. 3. Adhesion chart of test on Temple Hill with untreated rail. Two diesel units and 77 cars (60 loads, 17 empties), totaling 4,992 adjusted tons. Tonnage rating for grade 5,000 adjusted tons. Weather clear.

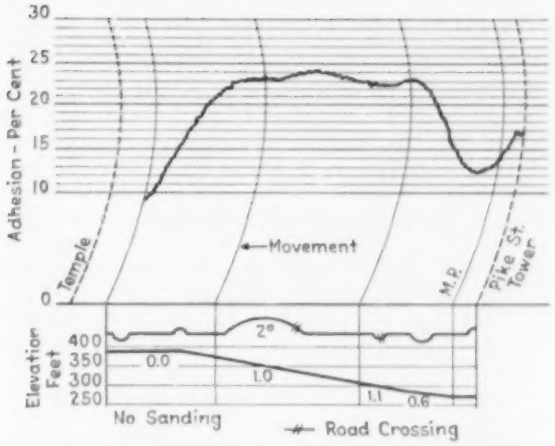


Chart No. 4. Adhesion chart of test on Temple Hill with conditioned rail. Two diesel locomotive units and 93 cars (53 loads, 40 empties) totaling 5,758 adjusted tons. Tonnage rating for grade 5,000 adjusted tons. Weather clear.

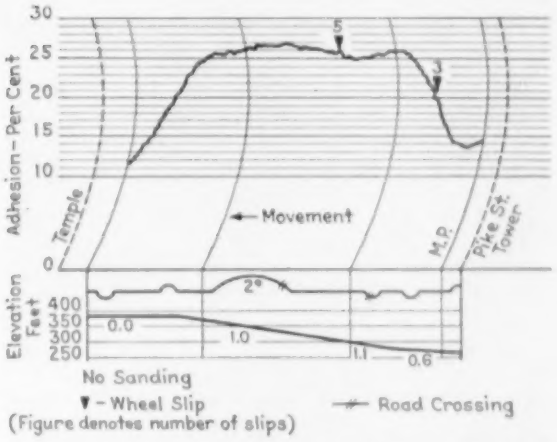


Chart No. 5. (left) Adhesion chart of test on Temple Grade with conditioned rail showing maximum adhesion developed. Two diesel locomotive units and 80 cars (70 loads, 10 empties) totaling 6,160 adjusted tons. Tonnage rating for grade 5,000 tons. Weather clear.

Successful tests were conducted in 1954. The method used, however, was limited to clear weather use since the cleaner emulsified on contact with wet rail and gave negative results. Moreover, costs proved prohibitive for practical operation. This left two alternatives: (1) concentrate on the mechanical and electrical causes of wheel slip mentioned above, or (2) seek some material (other than sand) which, when applied to locomotive wheels or rails, would almost instantly neutralize the oil film. Publicizing the work already done resulted in an offer by a chemical company of some materials of its manufacture which were said to increase rail adhesion greatly. Service tests proved these to be highly successful in rail conditioning. Variations of the conditioners have been evaluated on the dynamometer test stand. The best have been set aside for further testing in actual service.

Method of Conducting Field Tests

Road tests were made on two grades. The shorter, referred to as Temple Grade, is approximately 13,000 ft long. The ruling portion of 1.0 per cent is approximately 4,600 ft long on a 2-deg curve. The tonnage rating of this grade is 2,500 adjusted tons per diesel-electric locomotive unit. These units are 1,500 or 1,600 hp and have a continuous tractive force rating of approximately 52,500 lb. Depending upon traffic, the operation varies between 2 units with 5,000 adjusted tons, 3 units with 7,500 adjusted tons, and 4 units with 10,000 adjusted tons with 2 lead units, and a 2-unit pusher up the grade, or 4 units in the lead for the entire run.

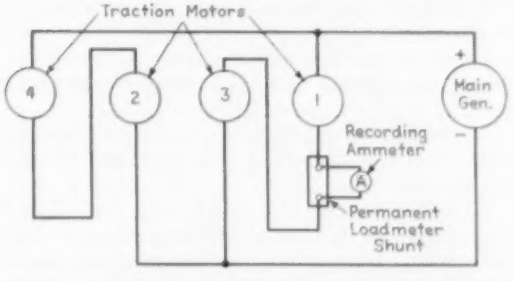
Two 1,600-hp road-switcher units with a rating of 5,000 adjusted tons were used as test units. They were generally assigned to train RB-2, which is usually dispatched from Reading Yard at the foot of the grade. The train has no momentum, therefore, the units are soon at full load on the grade.

This railroad operates all its freight trains on an adjusted tonnage basis. That is, the actual tonnage of the train is so adjusted for rolling resistance as to require the same drawbar pull per locomotive unit regardless of the train consist.

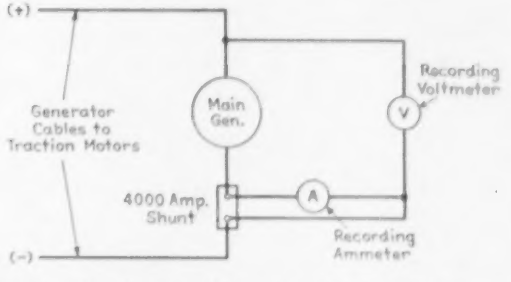
The longer grade, referred to as Catawissa Grade, is 35 miles long with one mile of level tangent track near the middle. The average grade is 0.63 per cent. There are over 150 major curves, the sharpest being 12 deg 30 min. The tonnage rating on this grade is 2,400 adjusted tons per locomotive unit. The usual train consists of 3, 1,500-hp to 1,600-hp diesel-electric units with a trailing load of 7,200 adjusted tons.

Prior to each test run the wheel diameters of each locomotive unit were measured and the light weight stenciled on each car in the train was recorded, together with the load weight shown on the waybill. When no load weight was shown, it was estimated as accurately as possible.

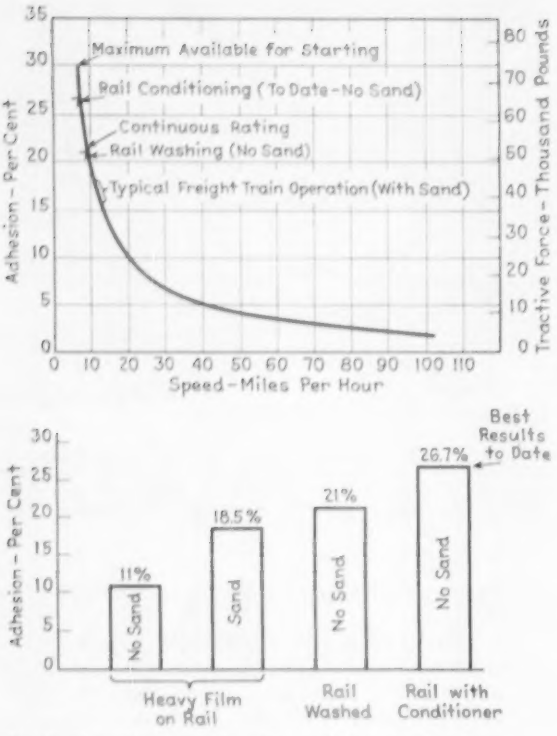
Test equipment installed on the locomotive units con-



Connections for the single ammeter used in the tests on the leading locomotive unit to record current in the No. 1 traction motors.



Connections for voltmeter and ammeter used in the trailing locomotive unit.



Results of service tests with various conditions of rail surface.

sisted of one single and one dual Esterline-Angus recording meters, and a transition indicator. The single instrument, an ammeter, was mounted in the cab of the leading locomotive unit and connected to record the current in No. 1 traction motor. The dual instrument was mounted in the cab of the trailing unit. An indexing needle on each tape of this meter is fitted with a push-button and used to record mile posts, stations or any other landmarks needed for identification purposes. The second indexing needle on the ammeter was connected in the wheel slip relay circuit to record wheel slips. The second needle on the voltmeter was connected across the sander circuit to record sanding operations. In addition, a transition indicator light was installed in the cab of the trailing unit. Observers in this cab kept a minute by minute log of motor current, speed, transition and other pertinent data.

Test Results

The adhesion graphs shown on the charts were made from the recording ammeter tapes of the runs indicated. They were selected to show operating conditions on normal rail as compared to washed rail and conditioned rail.

Chart No. 1 was chosen as typical of normal operation with untreated rail. Regular operating procedure was followed and no special instructions were given to the engineman.

The train was made up in the yard and dispatched at a point approximately 1,500 ft from the foot of the grade. Hence, there was no momentum to help ascend the grade. Intermittent sanding was used over the entire grade. In spite of this sanding, constant slipping occurred. By the time the locomotive had reached the center of the 2-deg curve sustained slipping required reducing the throttle twice for short intervals, as indicated by the chart.

The first impression gained from this evidence might be that tonnage ratings should be reduced. Operating experience on this grade does not bear this out. Trains are dispatched with the same adjusted tonnage and with normal rail and weather conditions satisfactory operation is obtained. The railroad operates similar locomotive units of different makes in this service. At the consent of the manufacturers the rating for all multiple-unit operation is 52,500 lb, continuous tractive force at approximately 9 mph. For the lightest units, weighing 246,000 lb, this equals 21.3 per cent adhesion.

Prior to the test recorded in Chart No. 2, the rail from Pike Street Tower to Temple Station—a distance of approximately 3½ miles—was washed. The engineman was instructed to use sand only if necessary to stop constant slipping.

Although this train did not start from rest at the foot of the grade, its speed through the station and yard was so restricted that the momentum to assist on the grade was no different than in the test recorded on Chart No. 1. The locomotive units used were approximately the same in speed-tractive force rating as those in Chart No. 1, and therefore would have practically the same hauling capacity. Nevertheless, slipping in this case was considerably less. Only sparing use of sand was required, and there was no need to reduce the throttle. The only physical difference was that the rail had been washed, using the method proved most effective by a long series of preliminary tests.

Regular operating procedures were followed during this test, recorded on Chart No. 3, and no special instructions were given to the engineman. The train was similar to that in Chart No. 1.

The test is used as a basis for comparison of performance on this grade with a series of rail conditioning tests. It also serves to point out that no apparent advantage is gained by using locomotive units of different manufacture if rail contamination is still present and all other conditions are equal.

As was the case with the test in Chart 1, adhesion at continuous tractive rating is difficult to maintain, and no appreciable difference can be attained with intermittent sanding used over the entire grade. In each case constant slipping is prevalent through the curves and on the entire grade.

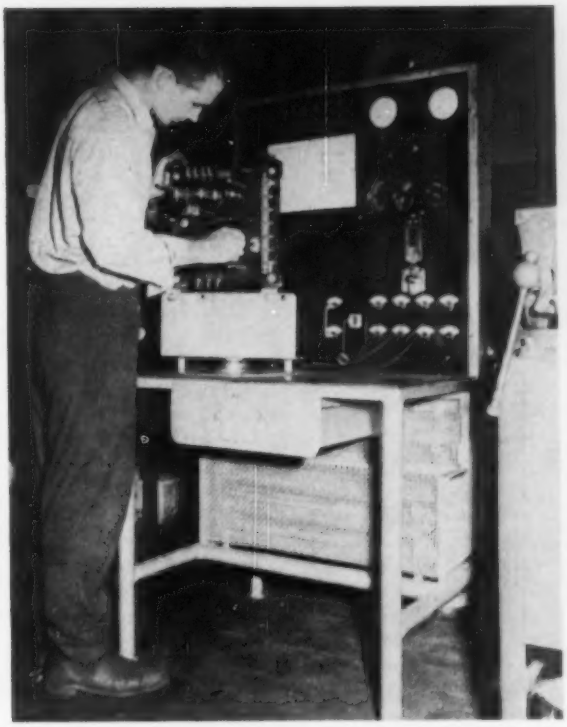
The test recorded on Chart No. 4 was made using rail conditioner. The engineman was instructed to use no sand at all.

The train exceeded the rating for the grade by 758 adjusted tons, or 15.4 per cent. Also, it was 16 cars longer than the train in Chart 3, and 22 cars longer than that in Chart 1. Nevertheless, it ascended the entire grade without a slip and without the use of sand. The maximum adhesion developed was 24 per cent on the lead unit. The motor current on both units was above 1,100 amp for 11 minutes (continuous rating for these motors is 1,085 amp).

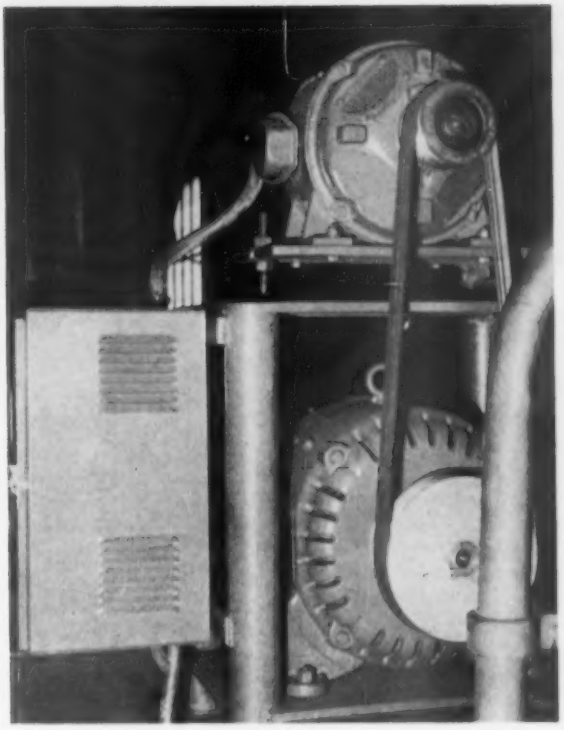
The test recorded on Chart No. 5 was made using rail conditioner. The engineman was instructed to use no sand at all.

The train exceeded the rating for the grade by 1,160 adjusted tons, or 23.2 per cent. Except for a few slips at road crossings prior to the most difficult portion, the train ascended the grade with no slips and without the use of

(Continued on page 68)



General view of the panel showing the generator load resistors below.



The m-g set on the balcony which supplies power for testing.

Test Stand for Auxiliary Generator Regulators

A STAND FOR THE TESTING of Electro-Motive, General Electric and Westinghouse auxiliary generator voltage regulators, developed in the Pt. St. Charles shops of the Canadian National, has proved its worth as a time saver. It permits the operator to find trouble quickly and to make accurate adjustments at all load values.

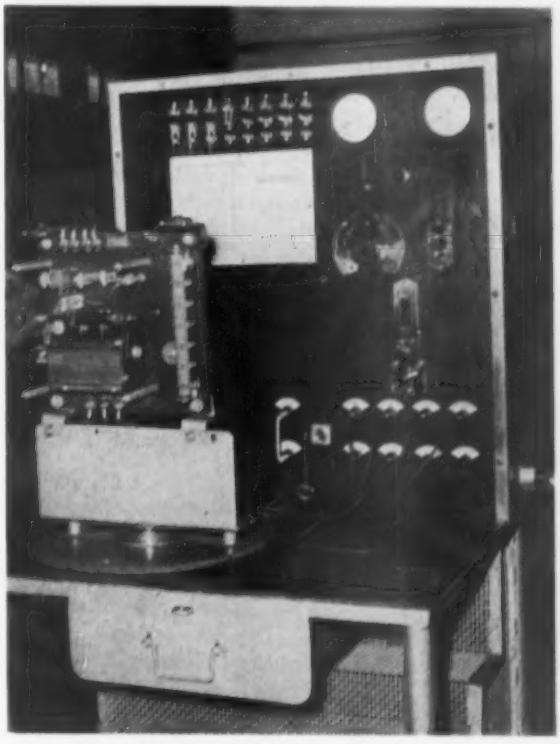
Power for making the tests is derived from a motor-generator set consisting of an Electro-Motive auxiliary generator, driven by a variable-speed motor. The set is located on a small balcony on one wall of the shop, and does not require floor space.

Speeds corresponding to those used in service on the locomotive are obtained by varying the motor field with the rheostat shown near the center of the panel.

The generator is loaded by means of resistors obtained below the panel, and zero to maximum load is obtained by cutting resistances in or out with the knife switches shown in a row at the upper left-hand corner of the panel.

The generator field is brought to the test stand and the plugs and jacks, shown at the lower right-hand corner, are so arranged as to introduce into the field circuit any resistances which may be a part of the circuit as used on the locomotive.

The generator voltage is applied to the regulator and the generator is run at all loads and speeds under the control of the regulator. Generator volts and amperes are indicated by the two meters at the upper right. The regulator is checked for possible stiffness or wear and is then adjusted until the voltage is 75 at all loads and speeds. A rotating base plate under the regulator being tested permits the operator to work conveniently on any part of the panel.



A close-up view of the panel with a Westinghouse regulator on test.

Planned Locomotive Maintenance Will Pay Out

By Guy Franklin

■ An adequate reserve of service miles in a locomotive is a real asset. Like money in the bank. To maintain a proper reserve of service miles in a fleet of locomotives is similar to maintaining a reserve in a bank account.

So it is in the maintenance of a fleet of locomotives. Service miles (in the form of needed repairs or maintenance) must be deposited regularly in the diesel fleet to balance off the service miles consumed in regular operation.

When a new locomotive is purchased a certain number of service miles are included in the purchase. That transaction represents the initial deposit made when one opens a bank account.

One can start withdrawing service miles at once, but you have then started writing checks against your LSM account.

Unless steps are taken to make new service miles deposits in the form of maintenance, the LSM account will eventually be overdrawn; and that is not good.

What is a good maintenance program? Its answer may be different on different roads due to the diversity of service conditions. The diesel-electric locomotive has brought with it completely new problems that require completely new methods.

It imposes not only new problems for the maintenance force, but it poses a new problem for management that must allocate maintenance funds. Care is needed to supply no more maintenance than is necessary, as that could be wasteful. However, there is usually a greater tendency to neglect or postpone maintenance needs and thus to hasten the day when the LSM account is overdrawn.

The judgment that was good for evaluating the needs of the steam locomotive requires a completely new set of values to apply to a diesel-electric locomotive.

The steam locomotive could be continued in service for some time after it got in a badly worn condition at only the expense of decreased efficiency. Something might break and fall, but not with the costly effect of a bad diesel failure.

When a diesel engine has a bad failure, it often means heavy repair or replacement expense, out of all proportion to the cost of preventive maintenance that would have eliminated the failure.

When the electrical plant on a diesel is neglected, its failure often involves a burn out of generator windings, motor windings or the control system.

The diesel electric locomotive is made up of some seventy thousand parts, containing concealed devices and parts, all vital to the proper functioning of the unit. These hidden parts cannot be judged by a passing glance from a visual inspection. It is necessary that a system of tests be regularly followed to be certain that all parts are functioning properly.

When tests indicate the need of repair or indicate incipient failure, then prompt action must be taken. It is not what is known about the need of repairs that counts; it is what is done about the things that one knows, that determines the final result.

An incident from real life will illustrate this point. A master mechanic was heard criticizing a maintainer for removing some traction motors for much needed attention. The criticism arose from the fact that the motors were still running when the alert maintainer discovered a condition that warranted prompt action to prevent a breakdown that would have involved heavy expense.

Just because a diesel locomotive is still operating is no sign it is in good condition. It may just be on the verge of a breakdown. It is therefore important that a good maintenance program be set up and followed. A good record system must be maintained as a guide to indicate what trend of change may be made in the program. It may be found that some practices may be changed for less frequent attention. On the other hand proper records may indicate that certain items need more frequent attention.

The locomotive maintenance problem is complicated by the fact that many records have received 20 or 30, or more new units in a single lot. These units all build up service miles at about the same rate, and thus the heavy repair problems become bunched.

Unless the program is planned to care for some units ahead of schedule to level out the program, there is bound to develop a series of emergencies. In those emergencies there is a temptation to resort to short cut or emergency repairs, which does not make for reliable service.

The need for locomotive repairs is far more difficult to demonstrate than for any other facility on the railroad. It is easy for a building maintenance officer to show that a bridge or building needs paint. It is quite another matter to convince management that a locomotive still operating has a lot of concealed worn parts that are approaching the breakdown stage.

The big question is, how shall the railroad maintenance dollar be spent? The situation is similar to that facing a fire chief who has received a call to two fires. Which shall be given preference? Something must be done and quickly.

Naturally preference is given to the call where the largest values are at stake, and where delay may prove disastrous. So it goes on the railroad. Preference must be given those items where the greatest values and greater risks are involved.

On that basis, the value and duty of the diesel locomotive demands and deserves a high priority in the expenditure of the maintenance dollar.

This article started on the thought that a proper reserve of locomotive service miles is an asset like money in the bank. It is even better than that.

Money alone will not move tonnage, whereas a locomotive with a reserve of service miles will do the job.

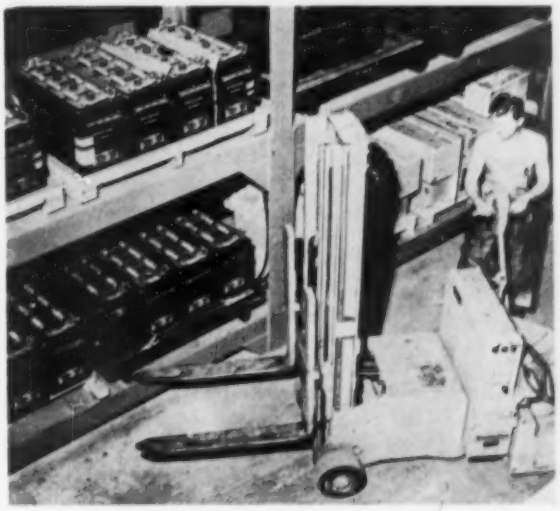
A careful consideration of the matter will convince any thoughtful person, that an adequate reserve in the LSM account is a must for successful railroad operation.

General view of the battery shop, showing working space under crane and four charging panels at the ends of each of four tiers of battery racks.

C&O Now Has Central Battery Shop

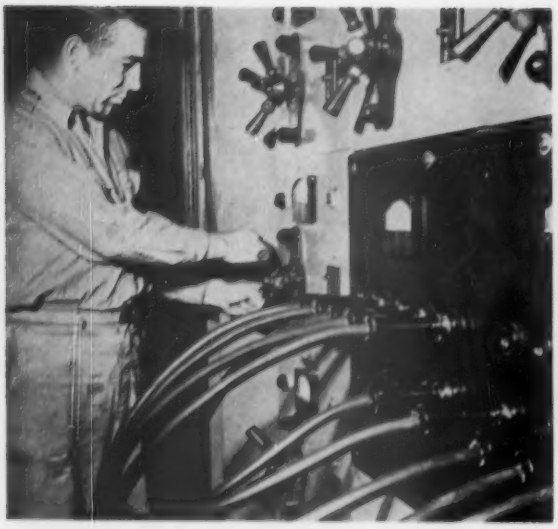
A CENTRAL BATTERY SHOP for testing, charging and repairing electric storage batteries on the Chesapeake & Ohio has been set up at Huntington, W. Va. The shop which measures 86 ft by 77 ft can handle 54, 64-volt passenger car batteries or 108, 64-volt diesel locomotive starting batteries at one time.

Complete facilities for charging, testing, and repairing locomotive, passenger car and truck batteries have been installed in a minimum of floor space

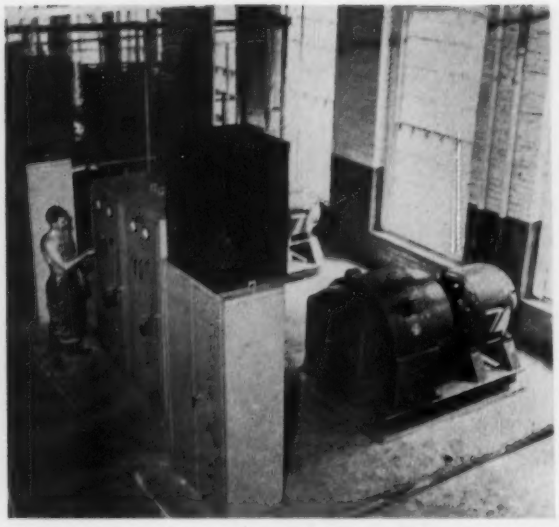


Batteries are charged and tested on pallets placed in three-tier metal racks. A high-lift electric truck handles pallets at any height.

Power is brought to the racks in fixed conduits to outlets in the bottom tier of each section of racks.

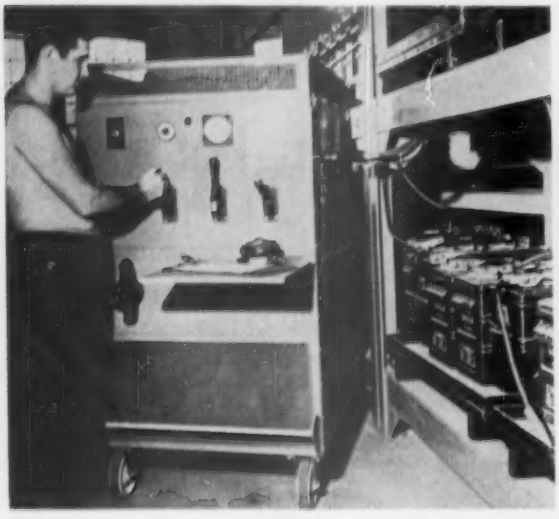


Above: Control panels, serving all batteries in each tier are located at the workroom end of the tier.



Above: Two generators can furnish 2,000 amp at 58 volts. Negative terminals of the generators are connected for flexibility. Each generator can therefore furnish current to all charging leads in the racks.

Below: Apparatus for giving batteries a test discharge is mounted on casters for easy movement. Equipment includes resistors, timer, buzzer, switches and fans for dissipating resistor heat.



Below: The distilled water tank is located above and between the second and third battery tier.

A section, 20 ft by 86 ft, along the front of the shop is devoted to overhaul and repair. The remainder of the shop is equipped with four battery racks, each three tiers high, where batteries are placed for charging, discharging and storage. Three of the tiers are 45 ft long, and one is 27 ft. long. The remaining space is used for two 2,000-amp motor-generator sets. At the rear of each tier of battery racks is a flight of stairs to reach an open metal runway between the two rows of batteries on each tier. Behind and above the battery racks, at the back of the shop, is a distilled water tank from which water is piped to points of convenience at the battery racks.

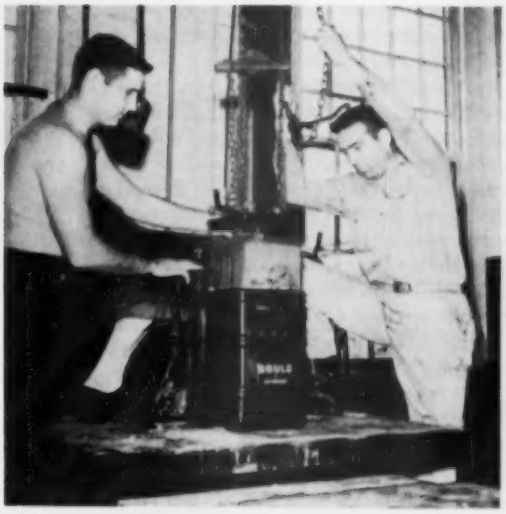
The battery overhaul section of the shop, is served by a two-ton crane and the batteries which go to the charging racks are handled on pallets where they are placed by a high-lift tiering truck.

Incoming batteries are first brought to a cleaning room at one end of the overhaul and repair section of the shop. Here they are steam and water cleaned and placed on pallets. If they are not in need of apparent repairs, they are moved by the tiering truck to a space on one of the battery racks. Open-circuit voltage and specific gravity are checked, and the battery is flushed as necessary.

A capacity test is run on the battery which normally consists of charging and discharging at the eight-hour rate. The discharge panel is mounted on rubber-tired casters so that it may be moved close to the battery under test. Diesel batteries are retired from their original service when their capacity falls below 85 per cent of their rating. Passenger car and truck batteries serve until their capacity is down to 80 per cent. Five and six-hour discharge rates may be used when time is limited. This requires checking the voltage more frequently during the end of the test period.

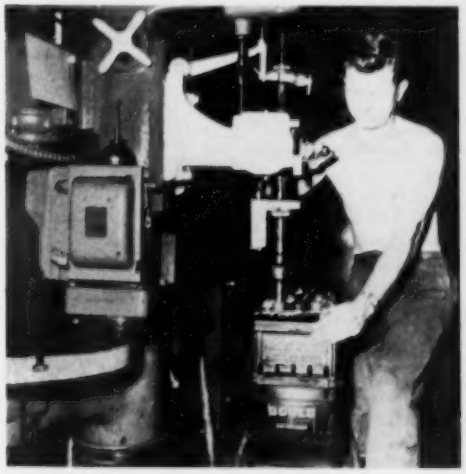
Generator voltage is held at 58 to include nickel iron batteries, used on shop trucks. All passenger car, diesel

A garage-type quick charger is available for charging six-volt batteries.



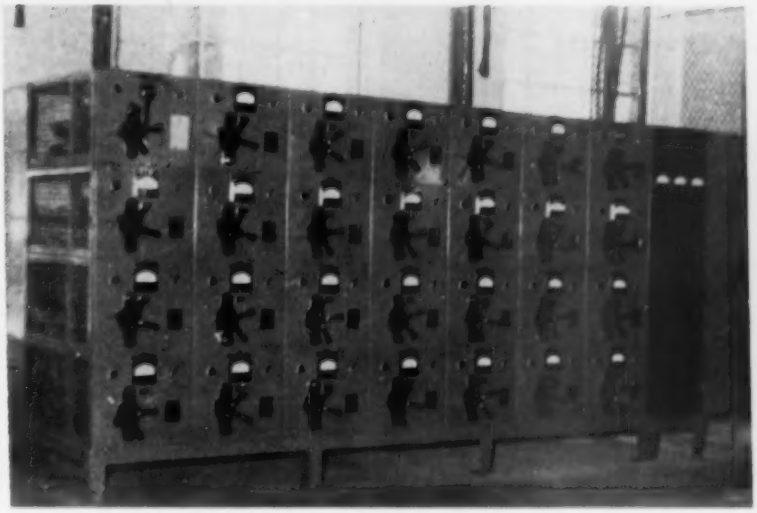
Hold-down clamps and a chain hoist are used to remove elements from a cell for examination.

A specially devised lifting rig which can be used to pull three sets of elements simultaneously.



A drill press is used to drill out intercell connectors if the cover of a jar must be removed.

The truck shop with trucks at charging stations.



The panel board in the truck shop for controlling the charging of truck batteries.

Enclosure for melting lead or sealing compound.

locomotive and industrial truck batteries on the racks are charged from receptacles mounted above the lower tier of batteries. The generator negatives are connected to one terminal of those receptacles. Generator positives are run to buses, one for each control panel at the front of each battery tier. From the buses, there is a lead to each circuit breaker, and from the breaker, the circuit is through a variable carbon resistor to a positive receptacle on the board. The jumpers on the board serve to connect any positive receptacle to any charging receptacle on the battery tier. There is a voltmeter and an ammeter on each charging circuit. All 64-volt batteries are charged with two halves in parallel. Double cables are used for this purpose. Miscellaneous batteries of the automotive, railway signaling and caboose radio types, which are also handled in the shop, are charged in series when possible, or by means of a garage-type quick charger.

A record of batteries under test is marked on a sliding board, mounted over each charging panel.

Maintenance and Repair

When each battery is washed as it is received, it is examined for possible damage such as leaking jars. If repairs are required or if the discharge test indicates internal damage, the cell is taken to one of two specially designed work benches, provided with a pulling block and with sloping drains so that acid and sludge can be collected at one end. A tank of water at the opposite end provides a place for soaking elements which have been removed from a battery.

A steam cover is used to soften cover sealing compound, and a drill press is available for drilling out inter-cell connectors when it is necessary to remove a cover. A clamping device and a small chain hoist are used to remove the elements from the container for examination. Lead burning equipment is available for reconnecting the cells and sealing the cover, and there is a gas-fired enclosure for a lead melting pot, or for melting sealing compound. Battery leads to be tinned are first wire-brushed and then tinned in the melting pot. Electrolyte for filling repaired batteries is prepared in two acid mixing tanks. Acid carboys are handled by means of the crane.

The shop truck garage which is 42 ft by 77 ft in size adjoins the battery shop. It provides charging outlets for 28 trucks and tractors, used in the shop, and there is sufficient space in front of each outlet for the truck or tractor to stand while its battery is on charge. In one corner of the truck shop, there is a battery charging control board with a charging control and resistor for each charging circuit. The 2,000-amp generators in battery shop also serve battery charging requirements in the truck garage.

High Driver-Rail Adhesion . . .

(*Continued from page 62*)

sand. The maximum adhesion developed was 26.7 per cent on the lead unit. The motor current on both units exceeded 1,200 amp for 13 minutes.

While locomotive wheel slip has been recognized as a major operating problem, both railroads and locomotive manufacturers initially tried to overcome it indirectly by electrical and mechanical means. When the gains resulting from this approach were weighed against the cost, the results were disappointing.

The discovery that thin, moisture-propogated oil films were the cause of poor adhesion, opened the way for a direct attack on the problem. The first took the form of rail washing, with the following results:

1. Washed rail showed a significant improvement over unwashed rail.

2. The method of washing required for practical use proved to be costly, tedious and complicated; requiring storage capacity for solution and water, and a means of producing hot water and steam.

3. Satisfactory results required such careful control of the working process as to practically necessitate its being made automatic.

4. Maximum adhesion resulting from careful rail washing was 21 per cent without sand (measured from traction motor torque at 9 mph train speed). Limited improvement on this value could be obtained with sand.

5. Rail washing did not remove the last vestige of oil film. Nevertheless, higher adhesions could be maintained on this thin film than on the same rail prior to washing. The use of rail washing and sand definitely improved adhesion in areas of heavy oil deposits.

In order to offset the limitations of rail washing, means were sought to improve adhesion by conditioning the rail in some manner other than by washing or sanding. Tests on a conditioning compound were begun in the spring of 1955. Up to the date of compiling this paper, the following results have been attained:

1. Improvement in adhesion with rail conditioner is much greater than with rail washing.

2. Improvement with rail conditioner as compared to normal rail conditions is exceptional.

3. Sustained adhesions have been obtained on conditioned rail as high as 26.7 per cent (measured from traction motor torque at 5.5 mph train speed). This value has been maintained without the use of sand.

4. The precise limit of adhesion possible with rail conditioning had not been established when this paper was compiled.

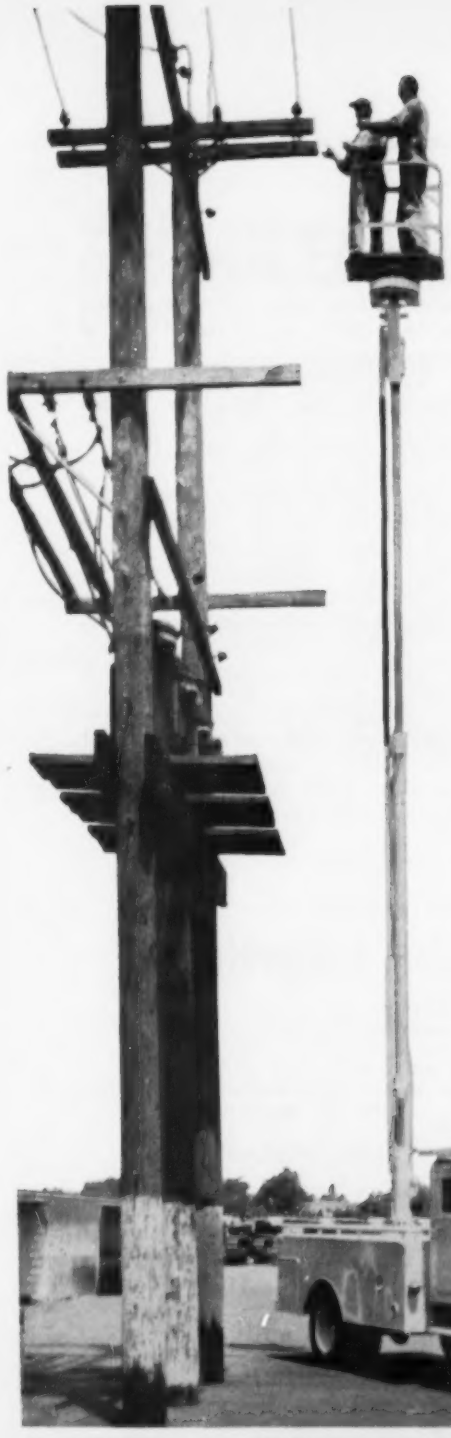
The adhesion curve indicates the steps of improvement to this date, and its significance in relation to the curve of the available tractive force of a typical diesel-electric locomotive.

The authors acknowledge the valuable assistance rendered by their associates in the preparation of this paper. They also acknowledge the assistance rendered by representatives of the following companies:

Manufacturers of equipment: Turbo Machine Company, Lansdale, Pa.

Manufacturers of cleaners: Dearborn Chemical Company, Chicago; Eagle Soap and Chemical Company, Reading, Pa.; Magnus Chemical Company, Garwood, N. J.; Oakite Products Company, Inc., New York; Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.

Manufacturers of conditioners: National Aluminate Corporation, Chicago.



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The agile swinging boom is comprised of an inner and outer member —both of Shelby Seamless Mechanical Tubing. Shelby Seamless is just the ticket for applications like this, for it offers the high strength, uniformity, dimensional accuracy, and dependability that only *seamless* can give. It is available in a complete range of diameters, wall thicknesses, and steel analyses to meet exacting requirements.

If you feel you'd like further information on applying Shelby Seamless Mechanical Tubing to your product, our engineers are at your disposal. Contact them at any time.

*Manufacturer's name on request.

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Questions and Answers

6-SL Brake Equipment

This is a new series of Questions and Answers pertaining to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

Main Reservoir Safety Valve

(Instruction Pamphlet 5046-15 Page 11)

W27-Q—What type of safety valve is used to prevent excessive main reservoir pressure on the locomotive?

A—The E7-C Safety Valve, Fig. 5, succeeds the type E7 used with former equipment.

W28-Q—How does the E7-C safety valve compare with the former design?

A—The operation of the two safety valves is identical. The E7-C is larger and its spring is heat resistant.

Pedestal Brake Valve—Fig. 6

(Instruction Pamphlet 5046-15, Page 13)

W29-Q—What type of Brake Valve is used with the 6-SL Brake Equipment?

A—The KH-6-P-Pedestal Brake Valve.

W30-Q—What is located on the brake valve pedestal?

A—An automatic brake valve portion with a rotary type valve for control of train and locomotive brakes. An independent brake valve of the self-lapping type. Sander valve, bell ringer valve, brake valve cut-out cock, and a D-24B feed valve (furnished with either pedestal or pipe bracket mounting).

W31-Q—Describe the installation of the brake valve pedestal.

A—Four bolt holes in the pedestal are provided for installation purpose. All pipe connections are made to the bracket face. The only piping i nthe cab is the copper tubing for gauge and governor connections in the upper portion of the pedestal.

W32-Q—What are the pipe connections to the pipe bracket?

A—Brake Pipe—1 in.—No. 1. Application Cylinder Pipe—3/8 in.—No. 2. Distributing Valve Release Pipe—3/8 in.—No. 4. Equalizing Reservoir Pipe—3/8 in.—No. 5. Main Reservoir Pipe—1 in.—No. 7. Bell Ringer Pipe—3/8 in.—No. 10. Forward Sander Pipe—3/8 in.—No. 11. Reverse Sander Pipe—3/8 in.—No. 13. Automatic Sanding Pipe—3/8 in.—No. 21.

W33-Q—What must be done when removing the automatic brake valve portion?

A—The automatic brake valve portion may be removed from the bracket by backing off nuts from studs, Fig. 6. First, however, the two-position cock should be closed and brake valve handle placed in Emergency position, and the main reservoir cut-out cock closed in order to prevent unseating of the feed valve slide valve (in feed valves other than the D-24-B) and the rotary valve of the automatic brake valve.

W34-Q—How is the independent brake valve portion removed?

A—By backing off nuts from the four studs (19).

W35-Q—What does the by-pass equalizing piston insure?

A—Insures like pressures in both brake pipe and equalizing reservoir during charging operations.

W36-Q—What does this feature make possible?

A—A prompt re-application when releasing the brake.

W37-Q—What does the by-pass equalizing piston, Fig. 7, consist of?

A—Piston (41) and piston stem (42), screwed together and held by the lock washer. The stem contains a light spring (45), which centers on spring seat (44) and normally holds check valve (43) on its seat.

Fairbanks-Morse
Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F359-Q—To what amperage is this relay set to operate?

A—160 amps.

F360-Q—What other relay does the GSR resemble?

A—Its functions are identical to the ground relay except that GSR uses a separate sealed reset switch.

F361-Q—How is the Hostler Control Switch (HCS) used?

A—As a controller for "B" units.

F362-Q—How does the Isolator (ISOL) function?

A—Starts engine and puts engine on or off line. Its positions are: "START," "IDLE" and "RUN."

F363-Q—How does the Governor Low Oil Switch (LOS) operate?

(Bulletin 1706, Section 132A, page 8)

A—Shuts engine down if engine lube oil pressure falls too low for engine speed being maintained.

F364-Q—What are the functions of Traction Motor Field Shunting Contactor (M-1-M-8)?

A—To shunt traction motor fields to increase motor

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for Diesel Locomotives

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D-16 FLANGE LUBRICATOR increases mileage between wheel turnings up to 40%

This new, *more positive* method of flange lubrication not only gives greatly extended wheel life, but substantially reduces shop costs, too. Oil pressure to each flange is positively controlled by six individually adjustable pumps that are gang-operated from a common linkage to the truck frame. Unit operates only when locomotive is moving. Can be used to lubricate center pin wear plate also, if desired. Full 16-pint capacity for extra mileage between refills. Write for complete information.

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field. Controlled by Vv (Traction motor field shunting voltage relay, forward sequence), Current Relay (CR), and on some units Vc (Traction Motor Field Shunting Voltage Relay Backward Sequence).

F365-Q—How does the NO A.C. Voltage Relay (NVR) operate?
A—De-energizes if alternator current voltage falls below approximately 100 volts.

F366-Q—What are the indications that this relay has functioned?
A—Alarm bells ring on all units and blue lights light on engine control panel of unit affected.

F367-Q—What happens if this relay is de-energized when motoring?
A—De-energizes TV to bring engine speed to idle. De-energizes EF to remove power.

F368-Q—Suppose the relay opens while throttle is in 5th or 6th position?
A—The Governor Solenoid (DV) shuts engine down.

F369-Q—What is the action if the relay opens during Dynamic Braking?
A—De-energizes P-1 to drop braking on unit and de-energizes TV to bring engine speed to idle.

F370-Q—What is the function of the Overriding Solenoid in the governor (ORS)?
A—Prevents load regulator from going to maximum field during wheel slip.

F371-Q—How does the Overspeed Magnet Valve (OSM) function?
A—When de-energized, to give automatic service application on air brakes.

F372-Q—What may bring this about?
A—1—Overspeed Switch opening at maximum locomotive speed. 2—Low battery voltage. 3—Control cut-out breaker tripping. 4—Engineer's Control Breaker tripping.

F373-Q—What is the purpose of the Overspeed Switch (in speed recorder)?
A—Opens to de-energize OSM if maximum locomotive speed is exceeded.

F374-Q—What is the purpose of the Power Contactors (P-1 P-2)?
A—They connect traction motors to main generator.

(Bulletin 1706, Sec. 132A, page 9)

F375-Q—What happens in Dynamic Braking?
A—In Dynamic Braking, the P-1 contactor connects the traction motor field (in series with the main generator.

F376-Q—How does the Pneumatic Control Relay (PCR) function?
A—Opens throttle control circuits when de-energized by opening of the Pneumatic Control Switch.

F377-Q—What results from this operation?
A—Power is dropped on all units and all engines are brought to idle speed.

General Motors

Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G369-Q—What takes place when the brake warning relay closes?
A—When the brake warning relay is closed, it will close a pair of contacts causing the brake warning light in the "A" unit to light.

G370-Q—What does this light indicate?
A—The brake warning light indicates to the engineman that one of the units is developing over 600 amps braking and that the brake lever should be reduced.

Operation

(Manual 2310, pages 317, 193)

G371-Q—What does the successful and dependable operation of the locomotives depend upon?
A—The quality of inspection and repair at regular maintenance periods, as well as the proficiency of the operating crews.

G372-Q—What should be done by the engine crew to supplement terminal maintenance?
A—A "pre-service check" should be made by the engine crew upon boarding the locomotive.

When Boarding The Locomotive

G373-Q—When making an inspection of the locomotive exterior and running gear, what would you look for?
A—(1) Liquids leaking from the locomotive. (2) Loose or dragging parts. (3) Position of angle cocks and shut-off valves. (4) Observe brake cylinder piston travel if air brakes are set. (5) Worn or missing brake shoes.

G374-Q—What switches should be checked in the operating cab?
A—Check to see that the control and fuel pump switches are in "ON" position.

G375-Q—What check should be made of the throttle?
A—See that the throttle is in idle.

G376-Q—What part of the air brake should be checked at this time as to position?
A—Check position of brake pipe cut-out cock, and rotair valve.

G377-Q—If the locomotive is to run light or haul a short freight train, how should the rotair valves be positioned?
A—In "PASS" position in the operating cab and in "PASS LAP" position in the non-operating cabs.

G378-Q—In what position should the controlled emergency cut-out cock be in, at the control valve on the "B" unit?
A—"PASS" position.

G379-Q—What do these positions insure?
A—Quick acting emergency on the locomotive.

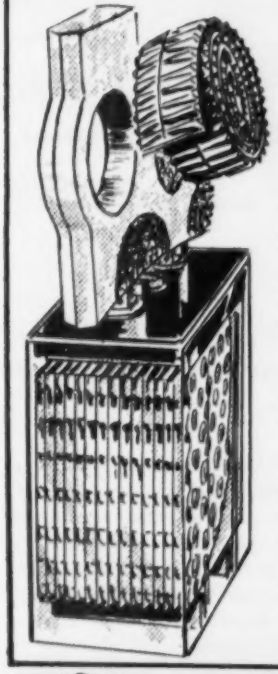
FACTS ABOUT Exide®

MANCHEX® RAILWAY SIGNAL BATTERIES

MOVE HEAVY TRAFFIC FASTER AND SAFER

... WITH DEPENDABLE EXIDE MANCHEX BATTERIES

CONTINUOUS, TROUBLE-FREE SIGNAL SERVICE TO KEEP TRAINS RUNNING SAFELY, ON TIME, IS ASSURED WITH EXIDE-MANCHEX SIGNAL BATTERIES. THIS MEANS MORE PAYLOAD, MORE PROFITS! WITH EXIDES, THE COST TO OWN - OPERATE - MAINTAIN IS PROVED LOWER. THEY ARE YOUR BEST POWER BUY - *AT ANY PRICE!*



BUTTONS OF LEAD

PROVIDE DEPENDABLE POWER... LONGEST BATTERY LIFE

THE IMPROVED PLANTÉ TYPE POSITIVE PLATES OF THE EXIDE-MANCHEX BATTERY ARE OF MANCHESTER DESIGN - AN EXCLUSIVE EXIDE FEATURE. BUTTONS OF LEAD DELIVER THE POWER YOU NEED, WHEN YOU NEED IT. OVER HALF A CENTURY OF DEPENDABLE RAILWAY SIGNAL SERVICE HAS PROVED THAT EXIDE-MANCHEX BATTERIES, WITH THEIR BUTTONS OF POWER — ARE YOUR BEST SIGNAL BATTERY BUY — *AT ANY PRICE!*

ASSURE CROSSING SAFETY

WITH EXIDE-POWERED AUTOMATIC GATES

WITH EXIDE POWERED GATES THE PUBLIC IS GIVEN THE UTMOST IN PROTECTION... AND RAILROADS AVOID COSTLY DELAYS CAUSED BY CROSSING ACCIDENTS. DEPENDABLE EXIDE BATTERIES FURNISH POWER FOR GATE MOTORS, GATE AND FLASHING LIGHT LAMPS. OPERATING COSTS ARE REDUCED, THE PUBLIC GETS POSITIVELY RELIABLE PROTECTION.

LET EXIDE HELP SOLVE YOUR SIGNAL BATTERY PROBLEMS. ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 5001, A SIGNAL BATTERY ENGINEERING AND MAINTENANCE MANUAL.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

Interchange Rules

194-Q—Inasmuch as the table in Section B of Rule 112 for per pound prices to be used in settlement for destroyed cars was modified in Supplement No. 1, effective August 1, 1955, to include a column covering per pound price for Class A flat cars only, what method is to be used hereafter insofar as flat cars other than Class A are concerned?

A—Per pound prices in the column of this table headed "All Others" should be used in settlement for all types of flat cars other than Class A.

[The above, which appeared on page 104 of the September 1955 issue, resulted in the following letter.—Editor.]

TO THE EDITOR:

I would like to refer to your September 1955 issue, specifically page 104, Question 194-Q, regarding comments on the settlement of other than Class A flat cars in accordance with AAR Interchange Rule 112.

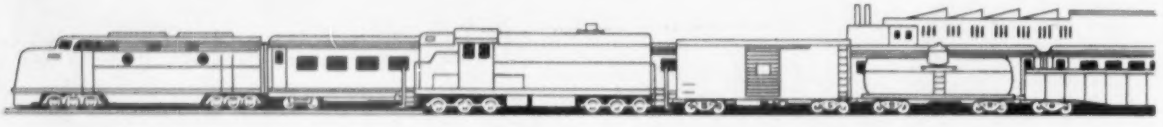
Rule 112 Section A, Paragraph 3 specifies that the depreciated value of any rebuilt or non-rebuilt car is based on a reproduction cost, less appropriate depreciation. Paragraph 4 of the same Section specifies that that reproduction cost is the product of the pound prices set forth in Section B and the stencilled light weight. In the Supplement No. 1 dated July 1955, to the Code of Rules, flat cars were designated in a separate column with a per pound price given only for Class A cars. Between indicated dashes there was no per pound price specified for Class D, E-1 or E-3 flat cars and since this per pound price was not furnished, Paragraph 3 under Section B would apply and the reproduction cost of such flat cars would be based on an adjustment of the original cost to date between indices published by the AAR Finance, Accounting, Taxation and Valuation Department.

Had the Arbitration Committee intended that the prices shown in the "All Others" column applied to the lower grades of flat cars these prices would be shown in the flat car column.

The Interchange Rules are exact and specific and allow no room for interpretations where definite instructions are set forth, as in this case. Please understand that this matter is brought to your attention only to prevent misconception and reflects my personal opinion only.

JACK DEINSHOCK
Supervisor Car Inspection, Southern Railway

?????



This is a department established to provide space for discussion of your mechanical department problems. We pay for contributions—both questions and answers. Submit them to our Q&A Editor. This month we have Two NEW PROBLEMS.

- *Can the responsibility for track-side fires ever be laid to diesel-electric locomotives?*

- *When a passenger car is reported as a "hard rider," what is checked, and in what order is this work done? What are the most frequent causes of poor riding?*

For ordinary heavy freight car repairs does it save time and money to assemble car sides or sections of car sides in a jig prior to their application to the car?

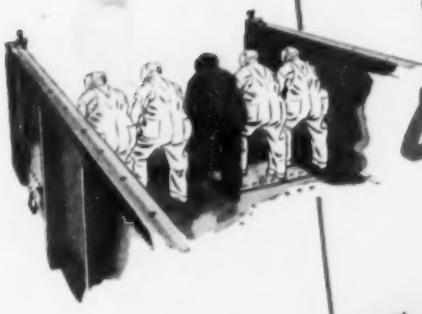
JIG USE REQUIRES SHOP SCHEDULES, *by A. W. Alfreds, Mechanical Superintendent, Car Department, Union Pacific, Omaha, Neb.* We are great believers in the use of jigs for all types of subassemblies. If you have a program of a sufficient number of cars, the cost of manufacturing the jig is more than repaid.

However, we do not feel that the construction of jigs is justified on any program of less than 20 cars. In the interest of uniformity and efficiency we do use jigs on all subassemblies on car programs. This requires that we line up our work so that we always have sufficient cars to justify the construction of jigs.

DIFFICULT FOR SMALL ROAD, *by General Car Foreman.* For a small railroad with a variety of equipment and a shop program that calls for the repair of only a very few cars per month, we have never been able to justify the construction of jigs for subassemblies. Our repair programs usually have not covered the repair of only one type of car, but rather have taken in any car that was bad-ordered to our car shop.

We have only one class of car that is owned in large enough numbers to ever justify a production line repair program, and this class of cars is not yet in poor enough condition to require heavy repairs. Building up individual cars by assembling the component parts in place on the car is the only method of repair we have ever used, and it appears that this will continue to be the case.

One man DOES THE WORK OF FIVE!



WHEN YOUR GONDOLAS ARE EQUIPPED WITH . . .

DROP END BALANCERS

The Wine Railway method of applying torsion springing in combination with trunnion hinges has proved a faster, more economical and a safer way to close drop end gondolas. Because the torsion action is greatest when the load is the heaviest, there is no need for a crew of four or five men to close even the largest drop ends.

Used in conjunction with Wine Drop End Locks for positive closure, these two devices provide combined benefits for both the owners and the users of the equipment. To date, **7,136** gondola cars on **22** different roads have been equipped with this combination. Write for bulletins containing additional information.

THE WINE RAILWAY APPLIANCE COMPANY • TOLEDO 9, OHIO

SUPPLY TRADE NOTES

(Continued from page 18)

NICKEL CADMIUM BATTERY CORPORATION.—*Gordon R. Howe*, who recently joined Nickel Cadmium, has been appointed district manager of the company's new western office at 55 New Montgomery street, San Francisco.

■

WORTHINGTON CORPORATION.—*John B. Laramy* has been appointed assistant general sales manager.

■

LESLIE COMPANY.—*Sten Soderberg* has been appointed director of engineering at Lyndhurst, N.J.

INTERNATIONAL NICKEL COMPANY.—*Edward P. Sadowski* has become a research metallurgist, Development and Research Division, Iron Alloys Section.

■

TIMKEN ROLLER BEARING COMPANY.—*Daniel J. Girardi* has been appointed metallurgical engineer in charge of research and process control.

■

EX-CELL-O CORPORATION.—Ex-Cell-O has acquired a plant having 66,000 sq ft of floor space at Elwood, Ind. At Downey, California, a suburb of Los Angeles the company has acquired a 15-acre plant site, on which plans are now being made for the erection of a 60,000 sq ft manufacturing building.

Evans Taylor

ELECTRIC STORAGE BATTERY COMPANY.—*Evans Taylor*, Philadelphia branch sales engineer, has been named manager, sales engineering of Exide Industrial Division. He succeeds *E. J. Fitzmaurice, Jr.*, appointed Boston branch sales manager.

■

Robert E. Hunter

GENERAL MOTORS CORPORATION, DETROIT DIESEL ENGINE DIVISION.—*Robert E. Hunter*, director of sales, General Motors Diesel Limited of Canada, has been appointed general sales manager of the Detroit Diesel Engine Division.

■

DANA CORPORATION.—*Earl M. Douglas* has been named vice-president, with responsibility over technical activities relating to product engineering.

■

OWENS-CORNING FIBERGLAS CORPORATION.—The *Box Car Equipment Company*, Minneapolis, has been named national distributor of Fiberglas infestation control blankets for railway box cars.

■

NATIONAL MOTOR BEARING COMPANY.—*Park Q. Wray, Jr.*, replacement division sales manager, has been appointed general sales manager at Redwood City, Cal.

(Continued on page 80)

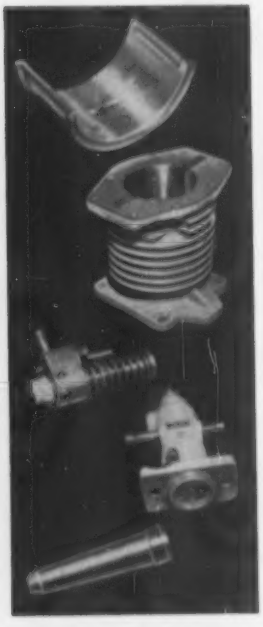
Good for another 300,000 MILES!

Restore worn diesel parts

(EMD, Alco, Baldwin, Fairbanks Morse)

LINERS
PISTONS
BEARINGS
INJECTORS
CRANKSHAFTS, etc.

chromed, ground, honed and lapped to standard size



When vital diesel parts become worn, restore them to new (even better than new) condition at less than new cost. We first Magnaflux-test each part, then hone and replace worn-away metal with wear-resistant chrome or bearing material. The part is then ground, honed and lapped to original size. The result—many, many more miles of service.

This partial list gives you an idea of the scope of our reconditioning service; *main and air compressor crankshafts; camshafts; bearings; pistons, cylinder heads; cylinder liners; air compresor cylinders; fuel pumps; injectors; barrels and plungers; Alco nozzle holders; suspension truck bearings.*

We also design and build all types of cutting tools, both hi-speed and carbide. Worn-out tools salvaged and remanufactured. Consider Railroad Parts Service "your other shop." We are always ready when you need us.

RAILROAD PARTS SERVICE CO.

2980 W. Davison Ave., Detroit 38, Mich.
Ray W. Prelkschat & Son, 8 S. Michigan, Chicago.
Charles Chapman, 205 Rose Bldg., Windsor, Ont., Canada.

SAND THE TRACKS . . .

NOT THE BEARINGS

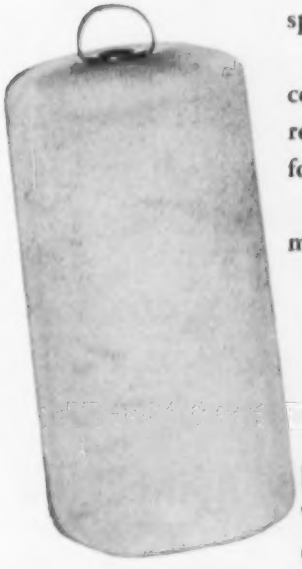
IN A SINGLE RUN FROM NEW YORK TO CHICAGO A DIESEL ENGINE CAN PICK UP ENOUGH GRIT . . .

to ruin it!

The GRIT is there . . . the engine picks it up . . . NOW, IT'S UP TO THE FILTER TO CONTINUOUSLY REMOVE IT! Abrasive substances are the enemy of operating costs and operating schedules. In bad weather they're useful on the *tracks,* but in lubricating or fuel oil—they spell disaster.

WIX Oil Filter Cartridges are the sound answer to the menace of oil contamination. WIX has studied the problem . . . conducted the continuous research to KNOW the answers . . . engineered filter cartridges specifically for railroad diesel service to provide maximum "engine-wear insurance."

Write for the WIX Railroad catalog and particulars on how you, too, may have a specialized study made on your oil filtration problems.



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ENGINEERED FILTRATION

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Warehouses

GASTONIA • NEW YORK • DES MOINES • SACRAMENTO • ST. LOUIS

WIX CORPORATION
Railroad Dept. RLC
Gastonia, N. C.

Please send catalog and particulars on your special oil filtration study.

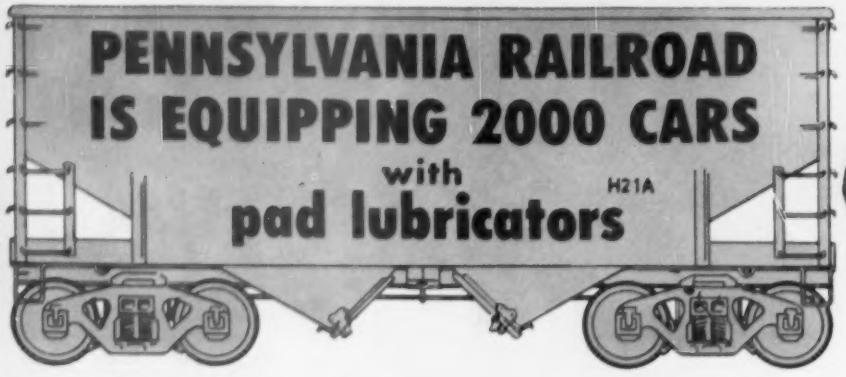
Name_____

Company_____

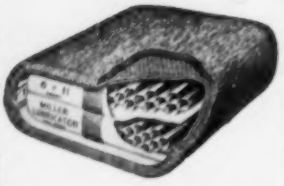
Address_____

City_____ Zone____ State_____

For Progressive Railroading



MILLER



PAD LUBRICATOR

• Cost – $40 per carset
• Life expectancy – 6 years

MILLER LUBRICATOR CO., WINONA, MINN.

Do you have an item you want manufactured and sold for you *on royalty or license basis*

?

The manufacturer of the Sweeney POWERENCH and other railroad maintenance tools is interested in the production and marketing of additional items.

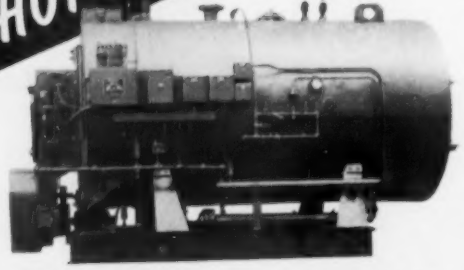
If you feel you have a good thing which is needed in the railroad industry, or any other field, write to us at the address below.

We are well equipped, both from a manufacturing and sales standpoint, to do an outstanding job with a needed product. An arrangement might be made that would be mutually beneficial.

Write to:

B. K. SWEENEY MFG. CO.
1601 23rd St. Denver 17, Colorado

GET YOUR **STEAM and HOT WATER** ... *from a* LOW COST PRODUCER!



Continental **AUTOMATIC BOILER**

... generates the steam and hot water you need with low fuel costs and very little maintenance. It is highly efficient—over 80% guaranteed—because of its unique "spinning gas technique". Hinged doors can be opened by one man in less than ½ hour, so there's brief shut-down for cleaning and inspection. Simple, functional design and quality workmanship assure long service life. Sizes 20 to 500 hp; 15 to 250 psi. Gas, oil or combination fired. Write for Bulletin BE3-4.

Continental AUTOMATIC BOILERS

BOILER ENGINEERING *and Supply Company, Inc.*

14 Manavon St. • Phoenixville, Pa. • Phone 5832

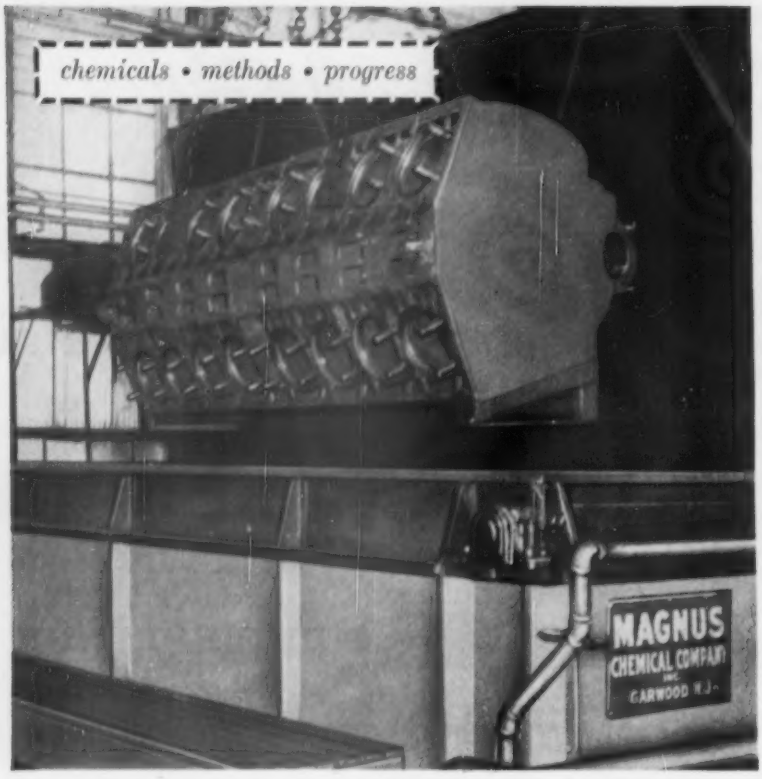
When You Compare Draft Gears...

Make sure you get *all* the facts.
Insist on seeing performance figures
obtained from *test track* runs...
measured and recorded on
modern *electronic* equipment...
under *actual* operating conditions.

National *Rubber-Cushioned*
Draft Gears give you protection
when you need it —
at high impact speeds!

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY
Cleveland 6, Ohio

AA-2156



5 Ton Diesel Block Cleaned in less than 90 minutes!

Fewer hours, better cleaning, easier handling at lower cost per job . . . these are the demands set forth by major railroads for the cleaning of 8, 12, and 16 cylinder blocks and bases.

Magnus, unlike any other company, manufactures both cleaning materials and equipment to work as a team, was able to come up with the answer to this problem.

The Magnus Aja-Dip machine cuts the cleaning time from six days to less than 90 minutes. Instead of requiring five men, it now takes only one. Instead of costing $360. per week using ineffective materials, with Magnus Super Strip and the Aja-Dip machine the cost per week was reduced to $145.

Find out how your shop can take advantage of the Magnus Method which pays off in dollars, time, and efficiency of cleaning.

Write to Magnus, 77 South Avenue, Garwood, N. J., for the latest issue of the complete 48-page Railroad Cleaning Manual.

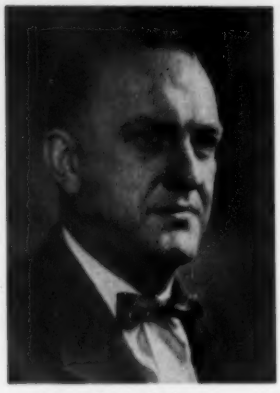
magnus

RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.

SUPPLY TRADE NOTES

(Continued from page 76)

G. L. Rutherford



J. R. Sinding

H. Lock

SPRING PACKING CORPORATION.—*George L. Rutherford, John R. Sinding* and *Harry Lock* have been named vice-presidents and *William J. Ennis*, assistant vice-president.

■

FRANKLIN RAILWAY SUPPLY COMPANY—*C. W. Floyd Coffin*, vice-president, has been elected executive vice-president.

■

CHIPMAN CHEMICAL COMPANY. —*Roger B. Coleman*, salesman, railroad division, has been promoted to assistant railroad division sales manager, at Bound Brook, N.J.

For Safe, Sure Operation of Rolling Stock and Signals

AMP

TERMINALS AND TOOLS HAVE PROVED THEIR VALUE!

AMP Plasti-Bond Terminals both ring tongue and flag were designed expressly for the railroad signal engineers.

AMP Pre-Insulated Diamond Grip & Solistrand terminals and connectors are standard equipment on original diesels and cars because they were designed expressly for diesel and car builders.

Hand and Power tools for speed, safety and secureness for applications using wire sizes up to 1 million circular mils.

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Aircraft-Marine Products of Canada, Ltd.
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NEW CATALOG

OF HARDENED AND GROUND STEEL

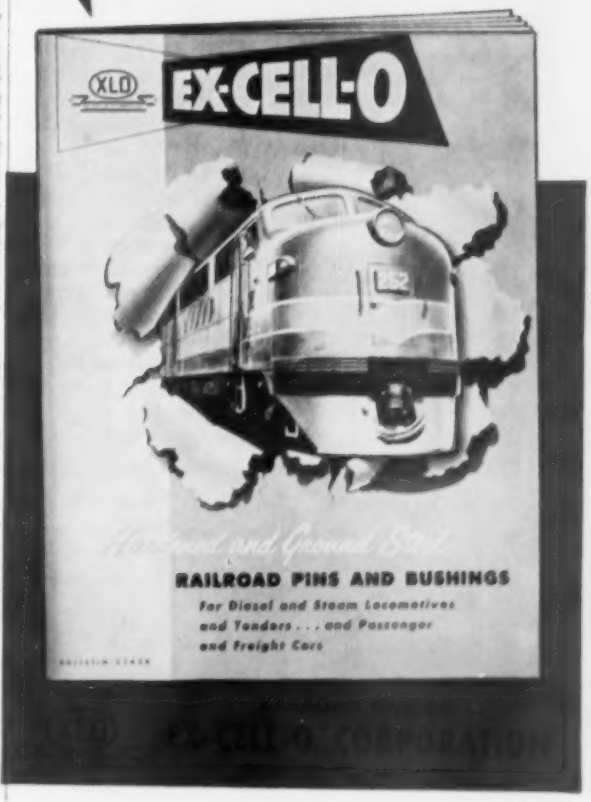
PINS AND BUSHINGS

Have within easy reach this catalog of STANDARD SIZES AND STYLES of Ex-Cell-O's long-service-life pins and bushings.

Ex-Cell-O heat treatment gives an extremely hard surface for wear resistance, a tough ductile core to withstand shocks and vibration. Over 200 railroads and equipment builders depend on Ex-Cell-O hardened and ground steel Pins and Bushings.

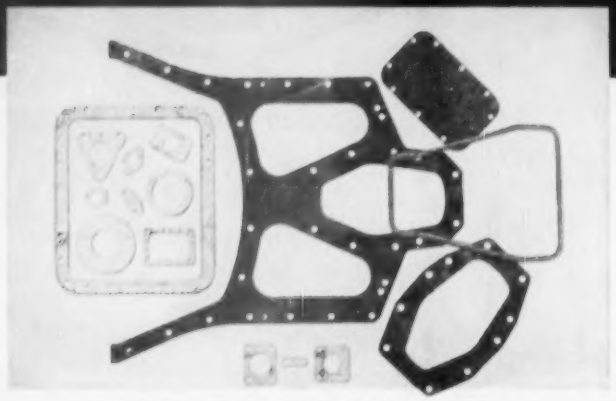
SEND FOR IT

Write to Ex-Cell-O for Bulletin 32559


XLO
EX-CELL-O
RAILROAD PINS AND BUSHINGS
For Diesel and Steam Locomotives and Tenders . . . and Passenger and Freight Cars
EX-CELL-O CORPORATION

68 Years of service to the railroad industry . . .

PUT GARLOCK'S VALUABLE PACKING EXPERIENCE TO WORK FOR YOU



Garlock replacement gaskets for diesel locomotives

Garlock LATTICE BRAID* Rod Packing

Garlock Molded Rubber Seal Rings

*Registered Trademark

DIESEL GASKETS, PACKINGS, and MOLDED RUBBER RINGS

Profit by the experience Garlock has gained in serving the packing requirements of most of the Class I Railroads in the United States and Canada. It's yours for the asking.

Your Garlock representative is a specialist who knows the proper replacement part for every diesel locomotive application. He can save you valuable time and help you reduce maintenance and replacement costs.

For your convenience, Garlock diesel replacement parts—gaskets, packings, and molded rubber rings—are pre-stocked in handy packages, ready for immediate shipment.

For long, dependable service, specify Garlock diesel replacement parts. Write for complete parts-and-price list.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

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Branch Offices in Most Principal Cities

GARLOCK

PACKINGS, GASKETS, OIL SEALS, MECHANICAL SEALS, RUBBER EXPANSION JOINTS

PULLMAN-STANDARD CAR MFG. CO. —*T. C. Gray*, vice-president in charge of engineering, is shown (above left), being presented with a Fellowship in the American Society of Mechanical Engineers by C. K. Steins, mechanical engineer, Pennsylvania, and chairman of the Railroad Division of the society. Presentation of the award for "outstanding ability and achievement in the mechanical engineering field" was made November 16 at the Railroad Division luncheon of the ASME held at the Conrad Hilton Hotel, Chicago.

■

B. H. Sullivan, Jr.

MAGNUS METAL CORPORATION.—*B. H. Sullivan, Jr.*, has been appointed assistant vice-president at Chicago, assisting in the handling of western sales. *J. J. Croft* has been appointed St. Louis district sales manager, and *J. J. Gruber* has been transferred from Cincinnati to the Chicago sales staff.

OBITUARY

HAROLD H. HENRICKS, 66, president of Youngstown Steel Door Company, died in Kansas City, November 20.

■

HERMAN F. BALL, 88, who retired as vice-chairman of Franklin Railway Supply Company in 1945, and as a director in 1952, died in Philadelphia, November 23.

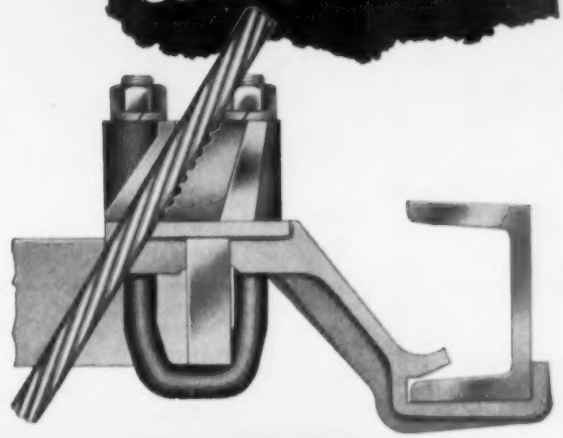
■

WILLIAM E. WINE, 74, honorary chairman of the board, Unitcast Corporation, Wine Railway Appliance Company and Industrial Steel Castings Company, died November 3.

■

A. J. ROSE, 66, vice-president, sales, Greenville Steel Car Company, died in Greenville (Pa.) Hospital, November 30.

for running repairs
The G. N.
BRAKE BEAM
safety support



gives extra safety in the brake danger-zone!

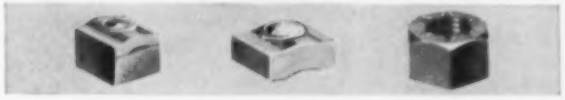
The G. N. Brake Beam Safety Support, through sound engineering, dependable performance and easy installation, can prevent a derail due to brake beam or brake hanger failure.

- THE COMPRESSION AND TENSION MEMBER CONNECTING BRACKET ASSURES PROPER LOCATION OF SUPPORT AT TIME OF APPLICATION AND IN SERVICE.
- Lightweight without sacrificing strength.
- Adjustable to provide proper clearance over bolster.
- No drilling, riveting or welding.
- Easy to apply on loaded or empty cars—NO NEED TO JACK CAR OR REMOVE TRUCKS.
- Wheels can be removed without disturbing supports.
- Attaches to brake beam only.
- To remove brake beam, only one side of support need be detached.
- A.A.R. approved (conditional)

WRITE FOR FULL PARTICULARS

OTHER GRIP NUT PRODUCTS

AD NO. 109



Grip Lock Nut #1 | Grip Holding Nut #2 | Railroad Gripco Lock Nut

GRIP NUT COMPANY

Serving American Railroads Since 1904

308-P S. MICHIGAN AVE. • CHICAGO 4, ILLINOIS

LIGHT • VERSATILE • TIMESAVING

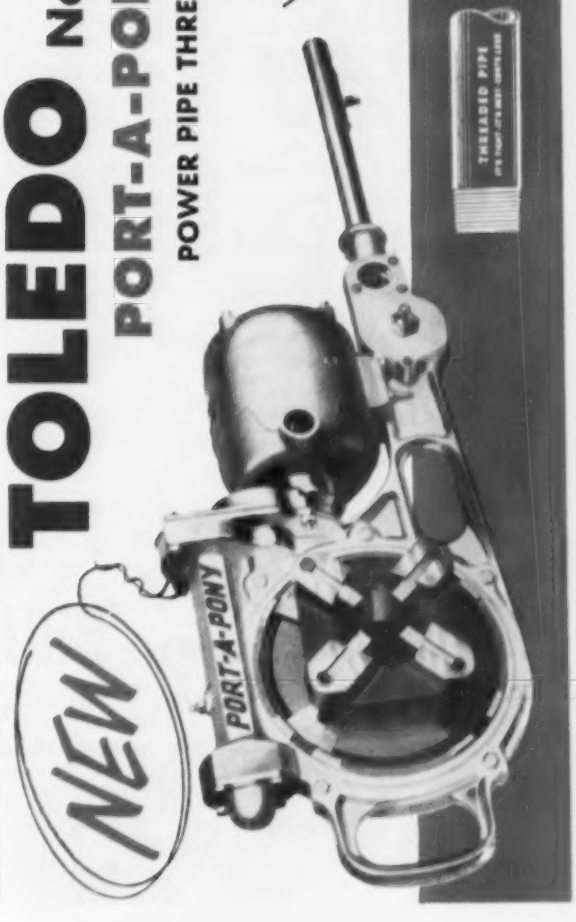
Here's a new tool that's so chock full of uses it is difficult to list all of them. Though originally designed as a means of power to operate pipe threading tools, it is a highly desirable unit for many other uses. For example: Opening and closing large valves, winching operations, pulling wire through conduit, hoisting operations, operating augers, cranking operations. The PORT-A-PONY is a powerful portable power drive that will greatly reduce manual labor. Weighs only 26 pounds. Rugged construction, sturdy reversible ½ H.P. motor. Send today for new colorful bulletin on the "TOLEDO" No. 68 PORT-A-PONY with all applications illustrated. Remember—if it bears the familiar "TOLEDO" label, you know it's a dependable product. Manufactured by Threading Machine Company, 1445 Summit Street, Toledo 4, Ohio.

TOLEDO No. 68

PORT-A-PONY

POWER PIPE THREADER

WEIGHS ONLY 26 lbs.



BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

BRUSH MILEAGE
versus
TROUBLE-FREE
COMMUTATION

Miles-per-1/8th-inch wear is an important factor in buying Diesel Electric Locomotive Brushes. But it is by no means the most important.

Long brush life is too often achieved at the expense of good commutation. And poor commutation may easily cost far more in terms of extra commutator reconditioning than can possibly be saved on brushes.

After all, diesel brushes average about $12 a set for the average traction motor. Commutator reconditioning costs a minimum of $400.

The moral is pretty obvious.

That's why smooth, burn-free commutation is the first consideration in the design of Stackpole Diesel Electric Brushes.

Performance records on twenty-one Class 1 roads clearly prove their ability to keep commutators in excellent condition over exceptionally long mileage schedules. Still more important, they prove that overall costs are materially lower when the cost of a few extra brush sets is stacked against the freedom from extra commutator repairs obtained through their use.

STACKPOLE
diesel-electric BRUSHES
STACKPOLE CARBON COMPANY, *St. Marys, Pa.*

NEW DEVICES

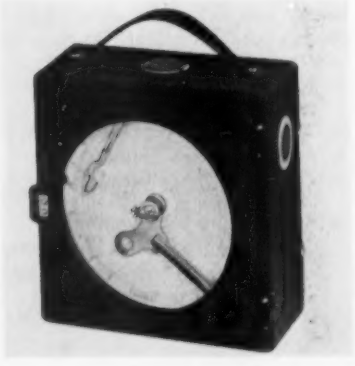
(Continued from page 6)

Direct-Reading Engine Hour Meter

This direct-reading meter is read the same way as the odometer in the speedometer of an automobile. Black figures show the total number of hours an engine has been operating; the red figure indicates tenths of hours. A rotating disc in the upper left segment of the face acts as an operating indicator, making one revolution a minute. The meter registers up to 10,000 hrs, then returns to zero.

The product is of minimum size, is said to be compact and easy to install in the field. The timing mechanism is an electrically wound clock which records the time of engine operation. It is designed to indicate operational time of any gasoline or diesel engine powered equipment.

The meter is available in 6-, 12-, 24-, 32-, 64- and 110-volt models in three basic types—standard, flush-mounting and aircraft mounting. *John W. Hobbs Corporation, Division Stewart-Warner Corporation, Springfield, Ill.*



Temperature Recorder

Model 8465, a high sensitivity bimetal actuated miniature temperature recorder, is a self-contained instrument that is said to be unaffected by atmospheric pressures. It is constructed to meet and resist severe

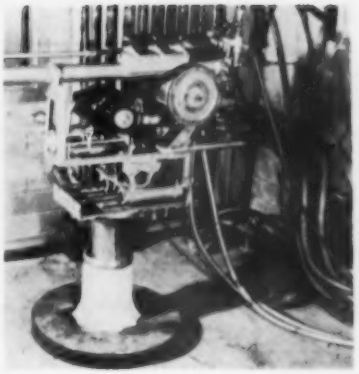
service and can be used on railway cars. It will operate in any position.

The case, of aluminum, provides maximum crash resistance and has no protruding parts. The recorder is furnished for temperature ranges from minus 40 deg to plus 140 deg F, in 50 and 100 deg included spans. Range changes can be made simply by inserting a new chart, and, using a thermometer as reference, adjusting the range changing screw with a screwdriver. *Weston Electrical Instrument Corporation, 614 Frelinghuysen avenue, Newark 5, N. J.*

Flame-Plating

Flame-Plating, is a method of applying coatings of tungsten carbide to metal parts. The deposit is made in the form of a hard, wear-resistant coating that can be applied in thicknesses ranging from 0.002 to 0.010 in. Controlled detonation is the key to the process in which particles of tungsten carbide are literally blasted onto the surface of a workpiece. This is accomplished through use of a specially constructed gun.

The gun consists of a barrel and a mechanism for loading precise quantities of tungsten carbide powder, acetylene and oxygen into mixing chamber. The powder remains suspended in the explosive gases until a spark ignites the mixture producing heat and pressure waves. The confining shape of the gun barrel concentrates these waves in a small area producing a tremendous heat and pressure build up.



When the temperature reaches 6,000 deg F., the waves of heat begin to move faster than the pressure waves. This heat wave rips through the mixture at 10 times the speed of sound leaving behind a block of pressure in which the tungsten carbide powder is suspended. Pressure reaches 10,000 psi. When the detonation wave leaves the muzzle of the gun it carries the tungsten carbide powder in a partially molten state as a blast against the workpiece. As blast after blast hits the work, particles build-up and fuse together until desired thickness is reached. *Linde Air Products Company, Division Union Carbide and Carbon Corporation, 30 East 42 street, New York 17.*

Carbide Tool Sharpener

This device, designed primarily for off-hand sharpening of single-point solid carbide and carbide tipped tools, functions without diamond wheels or abrasives. Known as Method X, its operating principle is relatively simple.

For a wheel, the machine uses a 10 in. iron disc, connected to serve as the negative terminal of an electric circuit. Similarly connected, the tool itself becomes the positive electric terminal. A semi-solid di-

Proved by USE!

Works in seconds! Loosens Rusted Bolts nuts, screws, "frozen" parts .... without breakage!

LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints LEAKPROOF!

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Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

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Super resistance to abrasion and corrosion makes this hose excellent for railroads, road equipment, farm machinery, and materials handling equipment. High tensile strength single wire braid. Tough synthetic rubber cover. Working pressures to 2500 psi. Bulk hose and fittings . . . complete hose assemblies at your dealer.

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Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number(s) on coupon below to receive desired information. Requests will be forwarded direct by the manufacturers.

1. DIESEL-LOCOMOTIVE BATTERIES. *C & D Batteries.* 4-page 2-color folder (DL-576) describes, illustrates, gives specifications and discharge characteristics of C&D diesel-locomotive batteries.

2. RAILWAY LUBRICATION GUIDE. *Continental Oil Co.* 66-page pocket-size booklet "Conoco Railway-Lubrication Guide" includes data on correct application of Conoco lubricants on all types of railway equipment, an explanation of lubrication specifications, a 7-page glossary of terms pertinent to petroleum products.

3. LOCOMOTIVE TRACTION SYSTEM. *General Electric.* 12-page 2-color bulletin (GEA-6085) "General Electric's Traction System Gives You Maximum Locomotive Performance" describes method of assuring better locomotive utilization and easier maintenance; discusses simply designed GE traction motor; includes photos, drawings, graph.

4. AUTOMATIC BOILERS. *Boiler Engineering & Supply.* 4-page folder (BE 4A) "The Continental Spinning Gas Technique" illustrates and discusses Continental automatic boilers; points out "method of obtaining maximum heat transfer with simplified design".

5. COMPRESSORS. *Worthington Corp.* 24-page 2-color bulletin (L-640-B1C) "Single-Stage Horizontal Compressors" gives data on basic specifications, standard equipment, running gear parts, capacity control, cylinder construction, feather valves and special applications; includes drawings and cut-away views.

6. INSULATED BOX CARS. *Evans Products.* New booklet "The All-Weather Modern Insulated Box Car" describes RB-DF freight car's advantages; includes reviews of test trips through high and low temperature extremes.

7. FIRE EXTINGUISHERS. *Walter Kidde & Co.* 12-page 2-color folder (P8R8) "Kidde Fire Protection" describes and illustrates the Kidde line of fire extinguishers, and complete fire detection and protection systems.

8. UNIT LOAD FREIGHT CAR. *Unit Load Car Corp.* 4-page 2-color folder "At Last . . . Speedy, Economical Loading and Unloading!" describe, depict and give specifications on the new Unit Load car divided into five compartments, each accessible from either side by overhead doors.

9. PUMPS; AIR BRAKE EQUIPT. *New York Air Brake.* 16-page profusely illustrated colorful brochure (#1102) describes products from full line of vacuum and liquid pumps, air brake equipment, hydraulic motors, controls and pumps; on-the-spot photos show industrial uses.

10. ADHESIVES, COATINGS. *Minnesota Mining & Mfg. Co.* 8-page 2-color catalog "3M Brand Adhesives, Coatings, Sealers Serving the Railroad Industry" gives 23 typical applications of 11 different types of 3M adhesives, coatings and sealers used on a typical piece of rolling stock; two pages of photos show application.

11. NICKEL. *International Nickel Co.* 52-page multi-color profusely illustrated booklet "This Is Inco's Huntington Works", the standard book explaining processes and operations at this West Virginia location; includes historical data on nickel, a diagram of nickel from raw material to finished stock, how hardness is controlled.

12. YARD AUTOMATION. *General Railway Signal.* 20-page folder (B190) "A New Standard of Freight Service For The Northwest" discusses Yard Automation at Northern Pacific Railway's Pasco (Wash.) yard; has aerial views and yard diagrams.

13. FLOOD REPORT. *Farrel-Birmingham.* 12-page pictorial brochure "Farrel-Birmingham Flood Report" shows graphically how the company's Connecticut plants were affected by the recent Northeast flood disaster; 27 photos record damage and recovery work.

14. NICKEL-PLATED STEEL. *Colorado Fuel & Iron.* 12-page technical manual on CF&I lectro-clad nickel-plated steel, presents technical description of products covering manufacturing techniques and fabrication procedures.

15. ELECTRIC MOTORS. *Howell Electric Motors.* 16-page 4-color catalog (N-100-R) "The Greatest Motor Advancement in 40 Years" describes and illustrates with photos and cut-away drawings the new Series 100 Howell electric motors.

16. FLEXIBLE HOSE LINES. *Aeroquip Corp.* 4-page 2-color announcement folder "Aeroquip Announces the Big News in Teflon Hose" shows the new Teflon hose line with detachable, reusable fitting; Bulletin AEB-9 gives complete technical and test data on Aeroquip 666 Hose and Super Gem fittings.

Reader Service Department — JANUARY, 1956
Railway Locomotives and Cars
30 Church St., New York 7, N. Y.

Please send literature circled below:

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Also, please send me additional product information as follows: (company, product & page number)

Name _____ Title or position _____

Company _____

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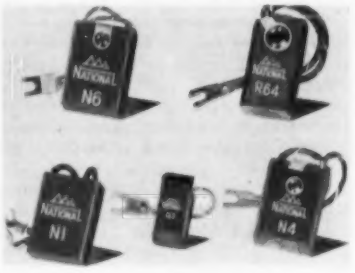
electric film applied to the cast-iron disc provides a spark gap of proper distance between those terminals. As the tool is oscillated across the wheel face, current pulsations are released as spark discharges. High current densities of the single-pulse discharge overcome the tensile strength of the material and a minute particle is removed from the tool at this point. The method does not cause parallel or unidirectional tool marks, heat checks or grinding cracks.

Chief feature of the method is its capacity to work materials of extreme hardness. No coolant is used in the sharpening process. Special operator skills are not needed for tool sharpening. *Ex-Cello-O Corporation, 1200 Oakman boulevard, Detroit 32.*



Brushes

The complete range of industrial motor and generator applications are serviced by a new series of National brushes intended to give maximum brush life with the best commutating characteristics. The Grade N-1 is a low-contact drop brush for a wide variety of equipment over a broad voltage range. This is a true electrographitic grade which can replace the metal-graphite brushes used on some 32-volt equipment. On standard-voltage enclosed machines the electrical losses are minimized at high operating temperatures.

Grades N-2 and N-6 are designed for machines with silicone (Class H) insulation. Their applications are in machines designed for high temperature operation where heat is dissipated by radiation. The Grade N-4 brushes are said to be true general-purpose industrial brushes. They give satisfactory service where there are wide load variations. These lamp-black base, electrographitic, non-abrasive brushes have a high current density rating, and are intended to have good commutating characteristics. Heavy-duty motors and synchronous converters are typical applications. The Grade R-64 brush is intended for services that involve high commutator surface speeds. *National Carbon Company, 100 East 42nd street, New York 17.*

Air-Acetylene Soldering Torch

The Torch-O-Matic is said to be the only fully automatic air-acetylene soldering torch on the market. A squeeze of the trig-

3-Vol. Complete Air Brake Course for apprentice classes or individual study

Written by V. M. Drennan, famed air brake teacher formerly with Westinghouse, these books utilize Mr. Drennan's tested and effective "Chalk Talks" method consisting of clear, simplified "blackboard" drawings that make the function of every part easily understood. Many photographs of equipment are also included.

Vol. 1 (ABC's of Air Brakes) covers friction and braking ratio and freight and passenger train brake control; function and operation of pistons, valves, electric controls and other components. Dictionary of words and terms used in air brake work.

Vol. 2 (Car Air Brakes) covers all car air brake valves and other devices; freight car brakes—AB, ABLC and AC. Passenger car brakes—D-22-P; electro-pneumatic; speed governor control; Decelostat equipment; universal control.

Vol. 3 (Locomotive Air Brakes) is a thorough exposition of all locomotive brake equipments. Covers air compressors, relay valves and miscellaneous devices. ET equipments and modifications and 24-RL equipment; equipments with electric controls; braking force control.

Interspersed throughout all three volumes are quizzes for review and testing of the student's progress.

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Send, postage prepaid:

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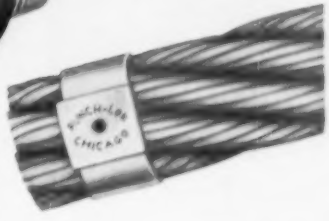
No Snag . . . No Leak . . . No Wear . . . No Tear

"The Sign of a GOOD Hose Clamp"



A simple operation by Doc Punch, with the assistance of Mr. Lok, and your shop hose is back on the job again. Punch-Lok clamps are also great for diesel engine overhaul jobs and ideal for seizing tough wire rope.

Write for complete product and price information.

PUNCH-LOK Company

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Dept. N, 321 North Justine Street, Chicago 7, Illinois

Lewis sealtite car bolts

More than 85% of America's Class I railroads use Lewis Sealtite products. Designed to do a better job . . . to last longer . . . to meet the most exacting specifications. Specify Hot Dip Galvanized, Zinc finish for Double-Life and economy.

All products are manufactured in the U.S.A. to A.S.T.M. specifications.

Lewis BOLT & NUT COMPANY
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LOOK FOR THIS STAMP OF QUALITY

Sealtite bolts are available with Locktite Nut #2 (shown), or std. sq. and hex. n

ger yields an instant flame. Release of the trigger shuts off the flow of acetylene and extinguishes the torch.

It is no longer necessary for operators to leave the flame on long after they are through using it, or during long intervals between occasions that they need it. This lessens the constant fire hazard and threat of personal injury. *Velocity Power Tool Company, 201 North Braddock avenue, Pittsburgh 8.*

Diesel Piston Cleaner

This method of cleaning locomotive diesel pistons semi-automatically is said to reduce labor and cleaning costs by 80 per cent. Using a Liquid Honing machine, the process requires one man instead of five formerly needed.

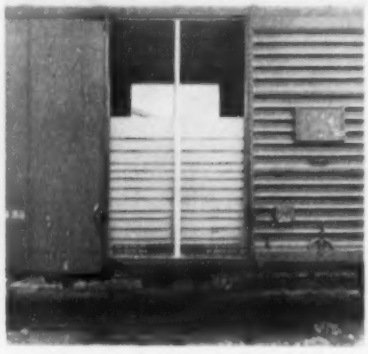
The device is capable of handling either of two sizes of pistons, standard equipment in the company's rolling stock of diesel locomotives. Each piston is placed on a rotating ring inside the cabinet where it is subjected to wet abrasive blasting from guns moving up and down over the face and inside the piston. A manual gun is used to clean the piston's crown.

The unit can also be used to clean valves, valve stems, fuel injector nozzles, fuel pumps and brush holding blocks for diesel locomotives. *Vapor Blast Mfg. Co., 3053 West Atkinson avenue, Milwaukee 16.*

Automatic Fluxing System

This system, created for production brazing of carbon and low alloy steels, brass and copper base alloys and monel, is said to have found acceptance also in surface silver brazing. It meters liquid flux into the fuel gas according to size of brazing tip and regulator pressure. The device may be attached to the welder's hand truck or to the fuel line at the brazing station.

The container is compact and sized to carry a 40-hr charge of fluxing liquid for brazing operations. *All-State Welding Alloys Company, 249-55 Ferris avenue, White Plains, N.Y.*



Center Door Posts To Cut Bulk Shipment Losses

A center door post has been developed that adapts to fit any size box car and requires no structural changes to the car. The post carries 75 per cent of the tremendous weight in the box car doorway openings to protect the regular wooden door posts from severe damage such as splitting and twisting. It also stops the coopering nails from pulling out of the regular wooden door posts, thereby eliminating of major cause of paper grain door failures.

Known as the Claim Saver Center Door Post, this product strengthens the doorway area by adding an intermediate support between the regular door posts. In this way the post can permit cars with wider doorways to be used for grain and other bulk commodities.

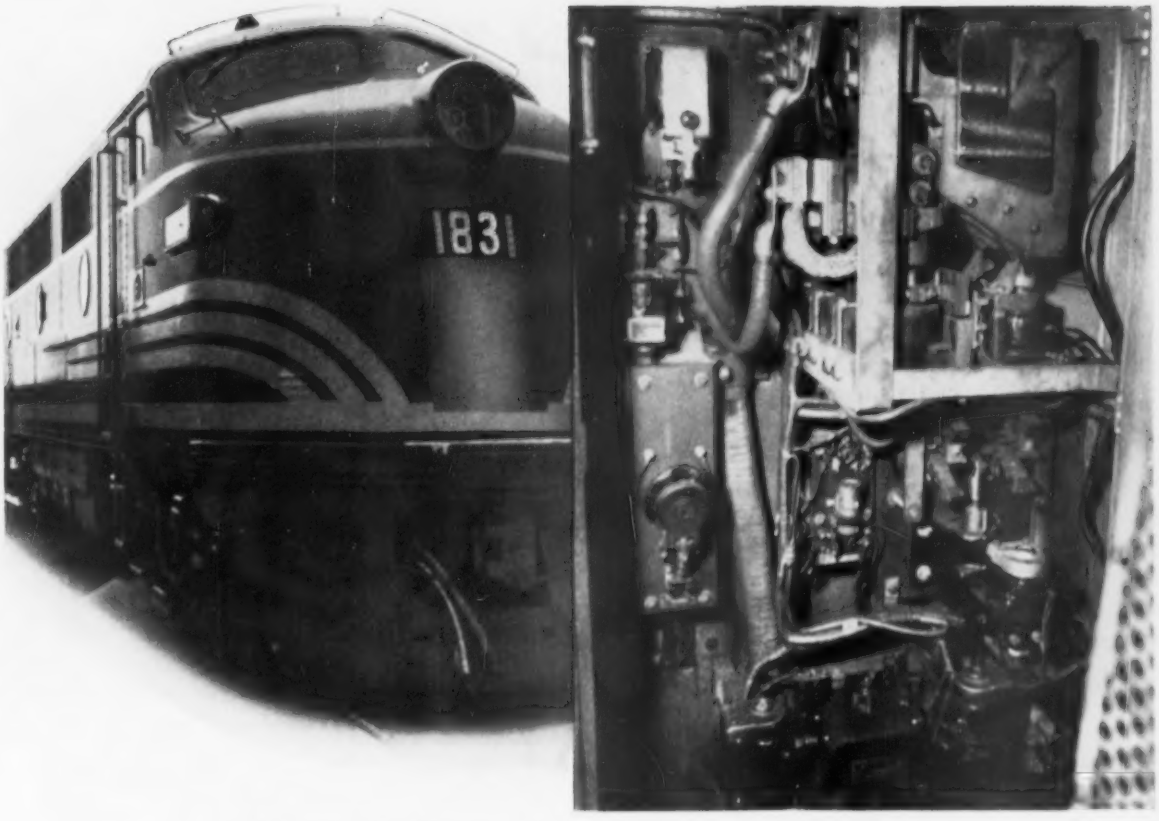
The post also saves coopering material . . . a 6-ft doorway box car, equipped with the "Claim Saver" center door post, can be coopered with a single course of only eight wooden door panels instead of the twelve panels that would ordinarily be used, saving approximately $8.00 per car in coopering material.

When not in use, both posts are recessed and locked into the side wall of the car, flush with the lining, completely out of the way, with no projection to rip or tear bagged loads.

The posts are "pushed" into position in a matter of seconds. When in use they lock into the floor plate and leave about 3 in. clearance between the outside surface of the post and the storm door. *Railroad Engineering Corporation, Aurora, Ill.*

Flange Type Hose Fittings

These split type flange couplings are available in straight, 45 and 90 deg assemblies and are designed to be used with the manufacturer's single-wire and double-wire braid hose. The four-bolt split flange is said to assure ease of positioning in installations, and rapid disassembly. The devices conform to all SAE specifications and are manufactured in sizes from ½ in. through 2 in. *Aeroquip Corporation, 300 South East avenue, Jackson, Mich.*



Simplex Diesel Locomotive Cable wears an *EXTRA TOUGH JACKET* against Abrasion, Heat, Water, Oil and Acids

- Simplex makes a cable for Diesel locomotives.
- It's insulated with a special rubber compound that heat won't crack or make brittle.
- It has a tough jacket that withstands abrasion, acids, heat, oil and moisture.
- Type A is built for use in conduits, cabinets and terminal boxes.
- Type B is for exposed locations. Type B is a sturdier cable with an extra heavy, reinforced jacket.

For detailed information, ask the Railroad Department at the address below

Simplex Diesel Locomotive Cable

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

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1 Plan your layout, equipment and payroll for the *minimum* anticipated volume. Keep men and machines busy all the time.

2 Send the jobs you can't handle without overtime to National for fast, high quality rewinding at economical prices—traction motors . . . diesel driven generators . . . auxiliary equipment such as car lighting generators.

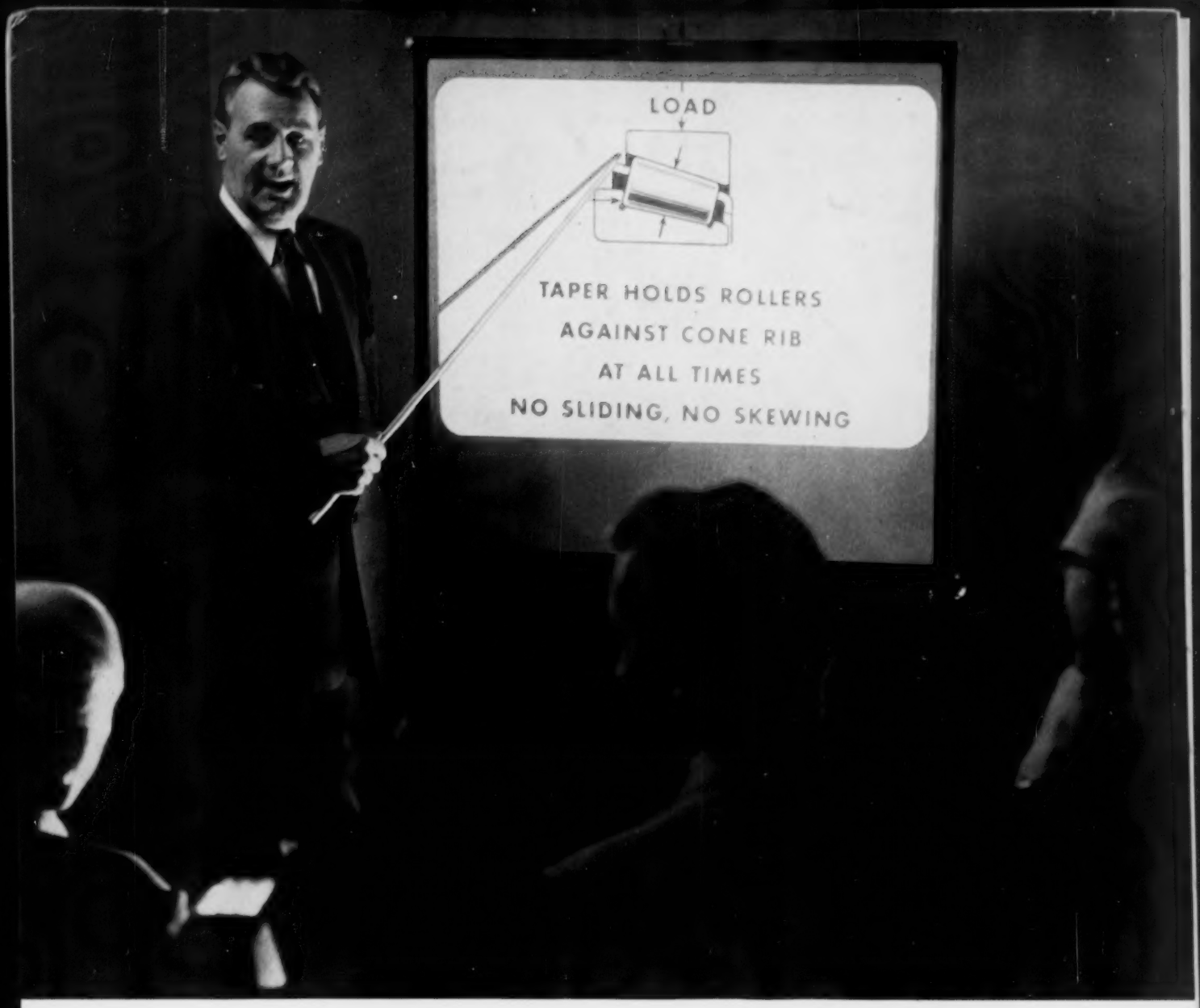
3 To assure quality and economy in your own rewinding work make National your first source for replacement coils and rewinding supplies.

The view above shows a part of the traction motor section at National's Columbus, Ohio, plant. For more information on how National facilities like these can help you get the most from every electrical maintenance dollar, write today or get in touch with your nearby National field engineer.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES



THE TAPER MAKES TIMKEN® THE ONLY JOURNAL BEARING THAT DELIVERS WHAT YOU EXPECT WHEN YOU BUY A ROLLER BEARING

WHAT you really buy roller bearings for is to end the hot box problem and cut operating and maintenance costs to a minimum. The only bearing you can count on to do both is the Timken® tapered roller bearing. Here's why:

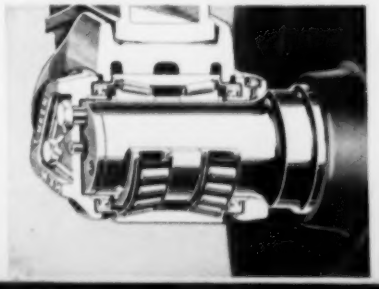
(1) *Positive roller alignment.* The taper keeps roller ends snug against the rib, where wide area contact keeps rollers properly aligned. There's no skewing of rollers to upset full line contact.

(2) *No lateral movement within the bearing.* Timken bearings always roll the load, never slide it. There's no lateral movement to pump lubricant through the seal, no scuffing of rollers and races.

Unlike costly devices that merely act as "crutches" in an attempt to improve friction bearings, Timken bearings remove the very *cause* of hot boxes—the friction bearing itself. They also cut operating and maintenance costs to the bone. For instance, they cut terminal bearing inspection time 90%, reduce cost of lubricant as much as 89%.

So when you invest to end the hot box problem and cut operating and maintenance costs to the bone, get Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ⊂⊃ AND THRUST ←⊂⊃→ LOADS OR ANY COMBINATION



THE TAPER MAKES

TIMKEN

THE BEARING YOU TRUST